The Bone

Precision Weapons Capability from an Operator

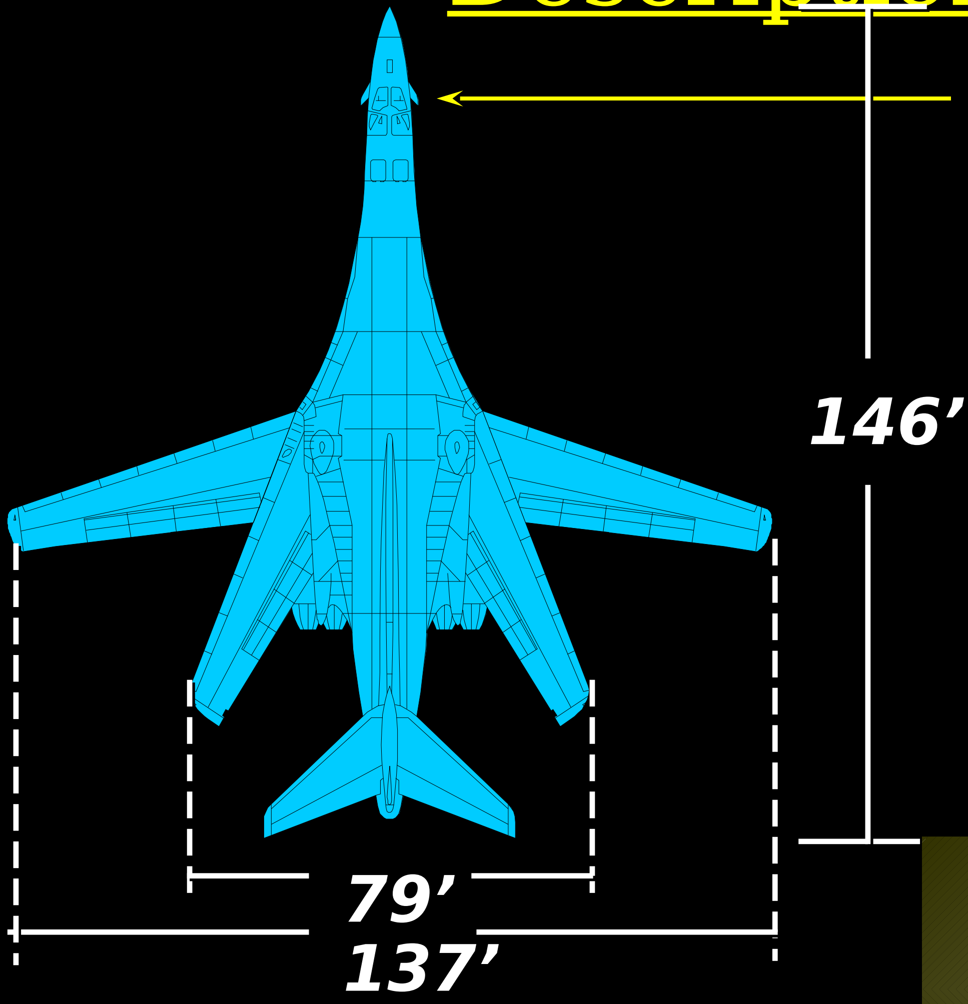
Lt Col West *"Elvis"* Anderson

National War College

Overview

- **Precision and “Block D”**
  - ***OEF & OIF results***
- **Precision and “Block E”**
  - ***Capabilities & Proposals***
- **B-1 Weapons Roadmap**
- **Thoughts on Optimal Design Capabilities**

B-1 General Description



"THE BONE"

Crew

2 Pilots & 2 WSOs

Performance Data

Cruise Speed: .65 - 1.2M

Altitudes: 200 ft - FL 350

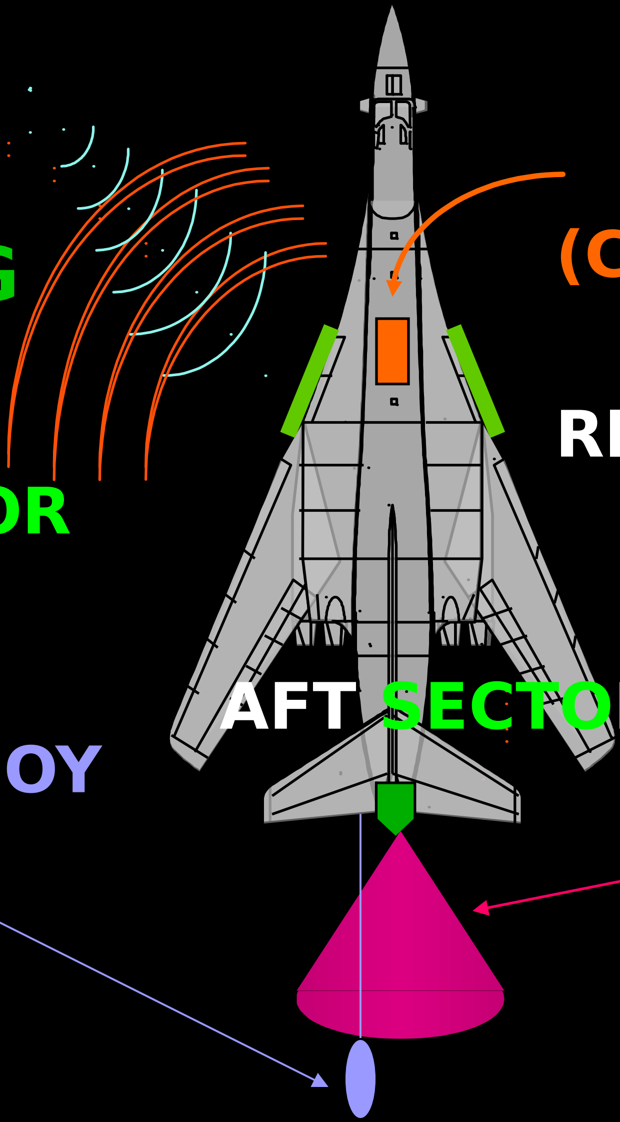
Range: Unlimited with Air Refueling

All Weather Day/Night Terrain Following

The B-1 currently holds 100 world records for aircraft speed - payload - distance and time to climb.

50 just set in October 2003

Defensive Avionics



JAMMING & RECEIVING

EXCM (CHAFF & FLARES)

LEFT SECTOR

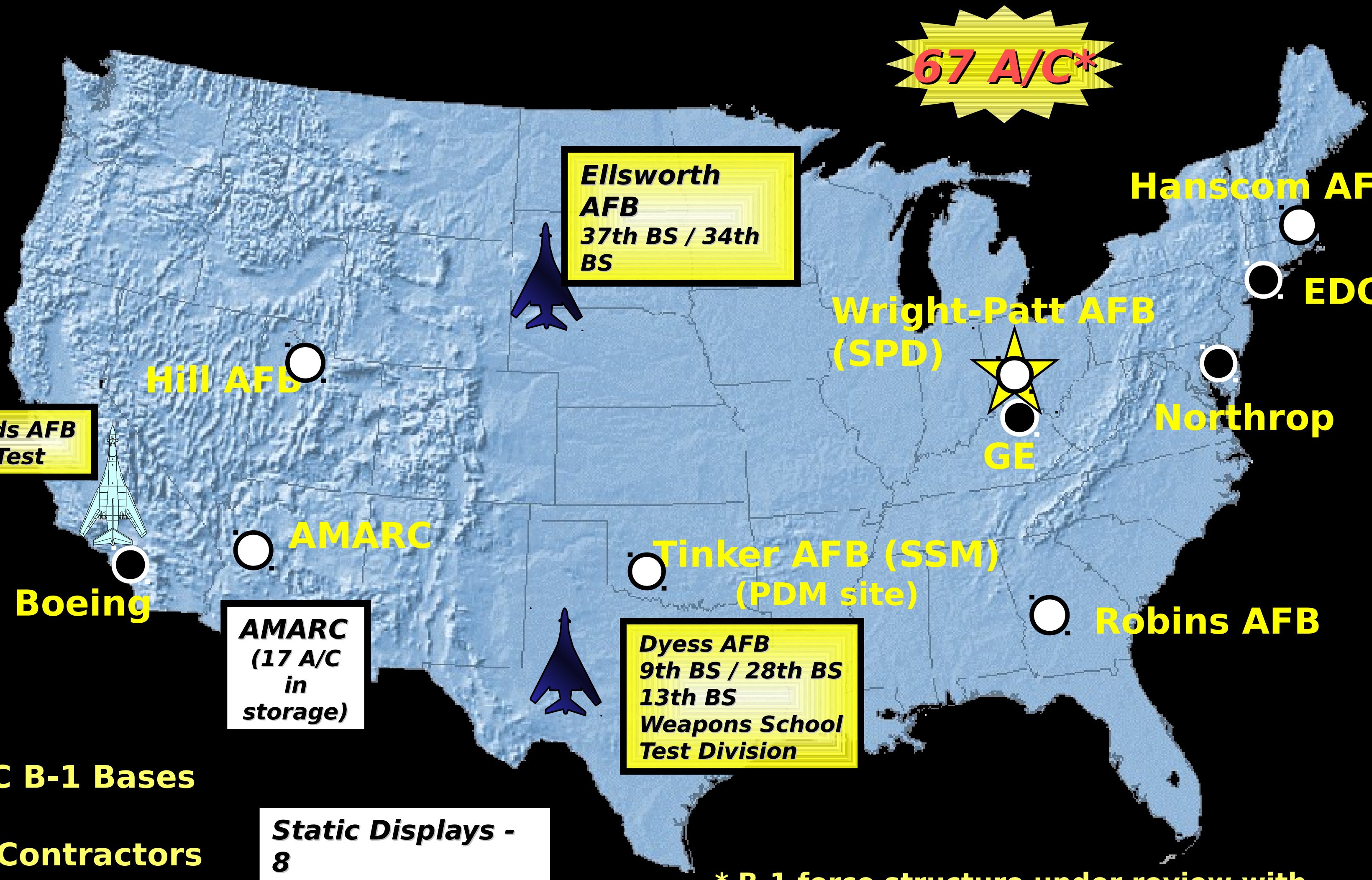
RIGHT SECTOR

AFT SECTOR

TOWED DECOY SYSTEM (TDS)

TAIL WARNING FUNCTION (TWF)

Aircraft Basing


67 A/C*
Hanscom AFB
EDO
Wright-Patt AFB (SPD)
Northrop
GE
Hill AFB
AMARC
Boeing
Tinker AFB (SSM) (PDM site)
Robins AFB

Ellsworth AFB
37th BS / 34th BS

Edwards AFB
419th Test

AMARC
(17 A/C in storage)

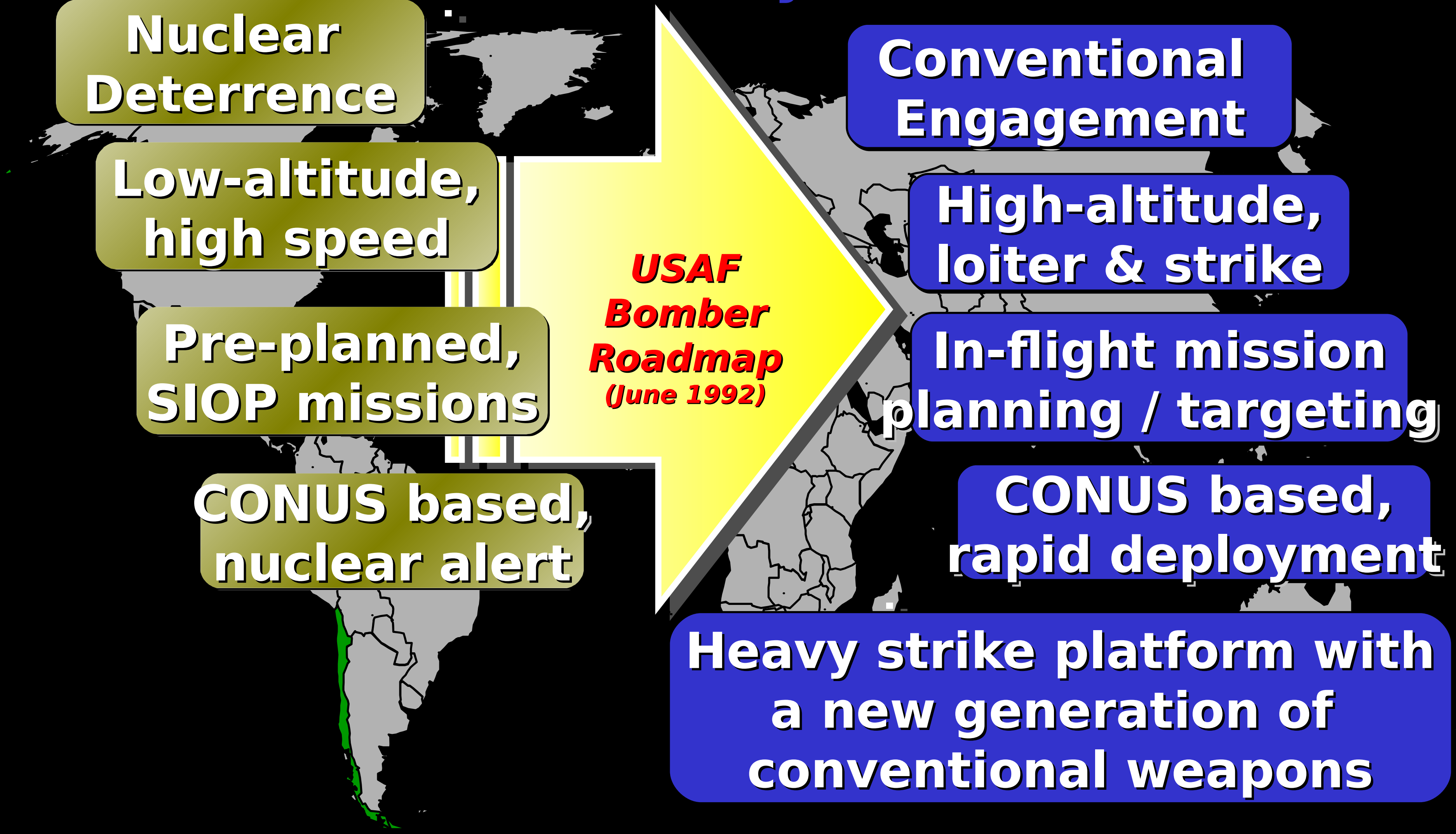
Dyess AFB
9th BS / 28th BS
13th BS
Weapons School
Test Division

✈ ACC B-1 Bases
○ Key Contractors
● Acq/Support

Static Displays - 8
[OPR: AF Museum]

* B-1 force structure under review with congress

B-1 Mission Evolution



Cold War B-1

- Nuclear Deterrence
- Low-altitude, high speed
- Pre-planned, SIOP missions
- CONUS based, nuclear alert

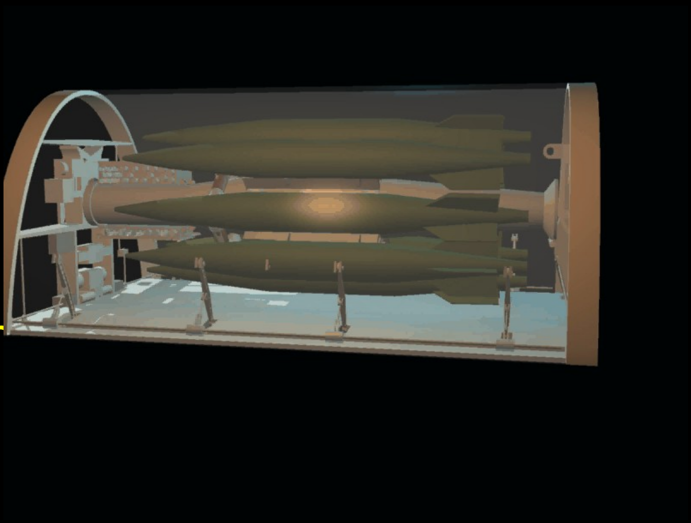
USAF Bomber Roadmap
(June 1992)

Today's (and Tomorrow's)

- Conventional Engagement
- High-altitude, loiter & strike
- In-flight mission planning / targeting
- CONUS based, rapid deployment
- Heavy strike platform with a new generation of conventional weapons

Block D

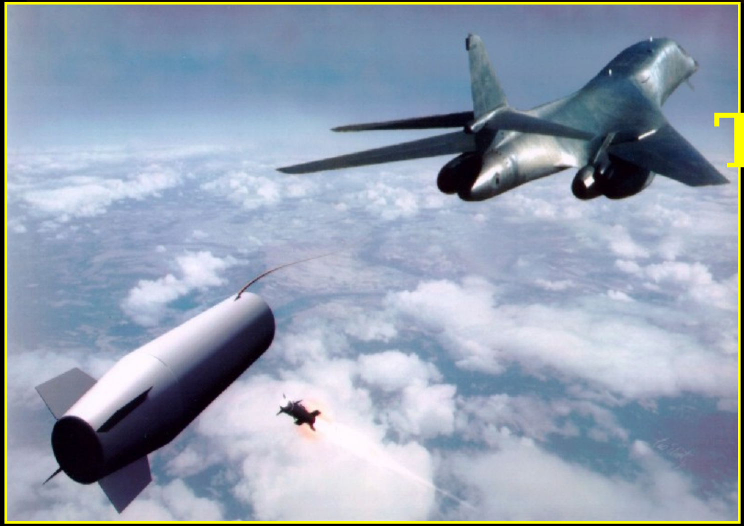
MilStd-1760 / GPS / JDAM / ARC-210 / TDS…



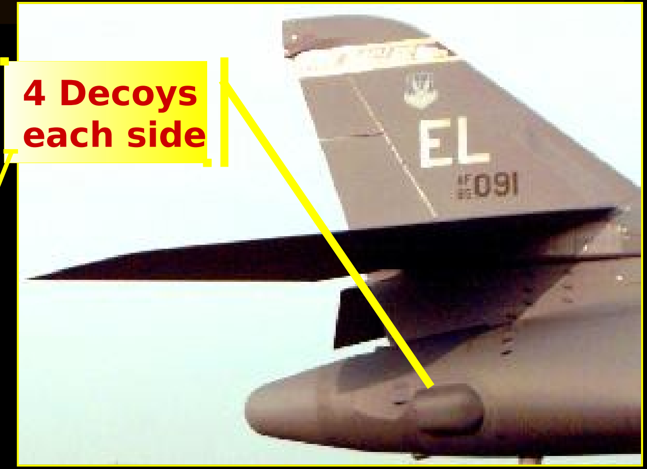
- Integration of JDAM (24 per B-1)
  - GBU-31 (Mk-84) and GBU-34 (Blu-109)
- Mil Std 1760 bus interface / GPS
- ALE- 50 Towed Decoy System (TDS)
- GMTI/GMTT mode (non-integrated to crosshair
- ARC-210 Radio

STATUS

- **RAA declared Dec 98 - operational in OAF, OEF & OIF**



ALE-50 Towed Decoy



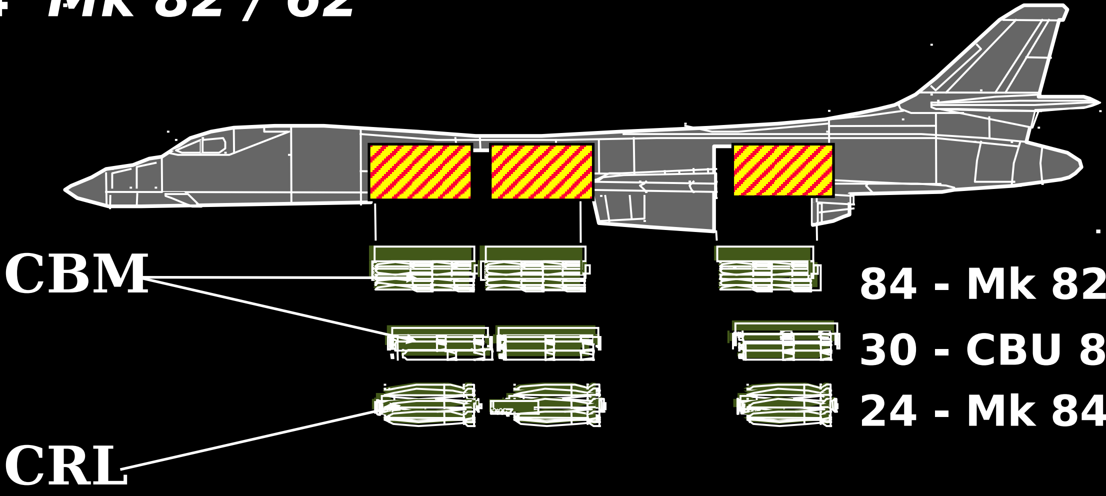
- **RF repeater**
- **Increases missile miss distance by decoying missile away from**

B-1 WEAPONS "Blk D"

84 *Mk 82 / 62*

30 *CBUs*

24 *JDAM / Mk 84*



84 - Mk 82, Mk 62

30 - CBU 87, 89, 97

24 - Mk 84, JDAM

Expeditionary Air Force

- 10 AEF “Buckets”
  - Full range of capabilities
- Global response
- CONUS to bare base to combat ops in min-time
- Deployment target length = 90 days
- Bombers were key in AEF

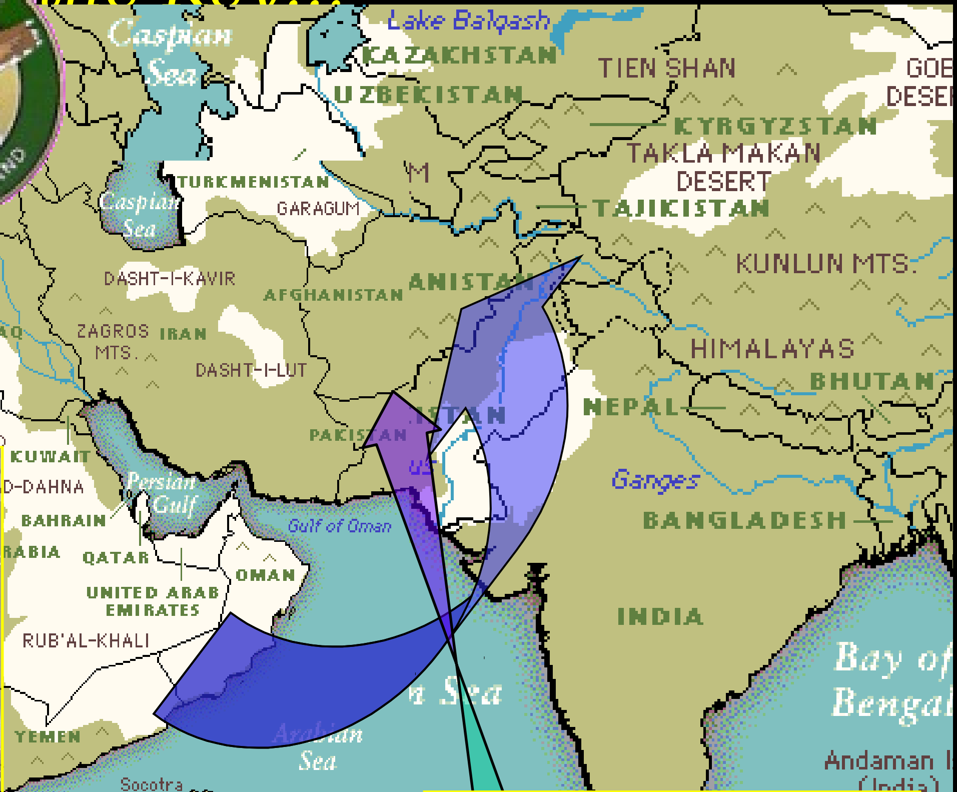
Operation ENDURING FREEDOM

The Nation Calls…

- Sept 11 Response - War on Terrorism
  - Oct 2001 – Ongoing / Afghanistan
- **B-1s dropped 38% of all weapons dropped while flying only 5% of the overall sorties**
- **B-1s dropped twice as many JDAM as all the rest of military aircraft combined!**

AOR

Long Range Airp the Key…


Caspian Sea
Lake Balqash
KAZAKHSTAN
UZBEKISTAN
TIEN SHAN
GOBI DESERT
KYRGYZSTAN
TAKLA MAKAN DESERT
TURKMENISTAN
GARAGUM
TAJIKISTAN
TAURUS
Crete
CYPRUS
Mediterranean Sea
SYRIA
LEBANON
ISRAEL
IRAQ
DASHT-I-KAVIR
ZAGROS MTS.
IRAN
AFGHANISTAN
KUNLUN MTS.
HIMALAYAS
BHUTAN
DASHT-I-LUT
EGYPT
JORDAN
AN-NAFUD
KUWAIT
PAKISTAN
NEPAL
Ganges
BANGLADESH
Persian Gulf
BAHRAIN
QATAR
Gulf of Oman
OMAN
UNITED ARAB EMIRATES
RUB'AL-KHALI
INDIA
Bay of Bengal
Arabian Sea
YEMEN
Socotra
Andaman Is. (India)
Microsoft Map

Expeditionary Mindset

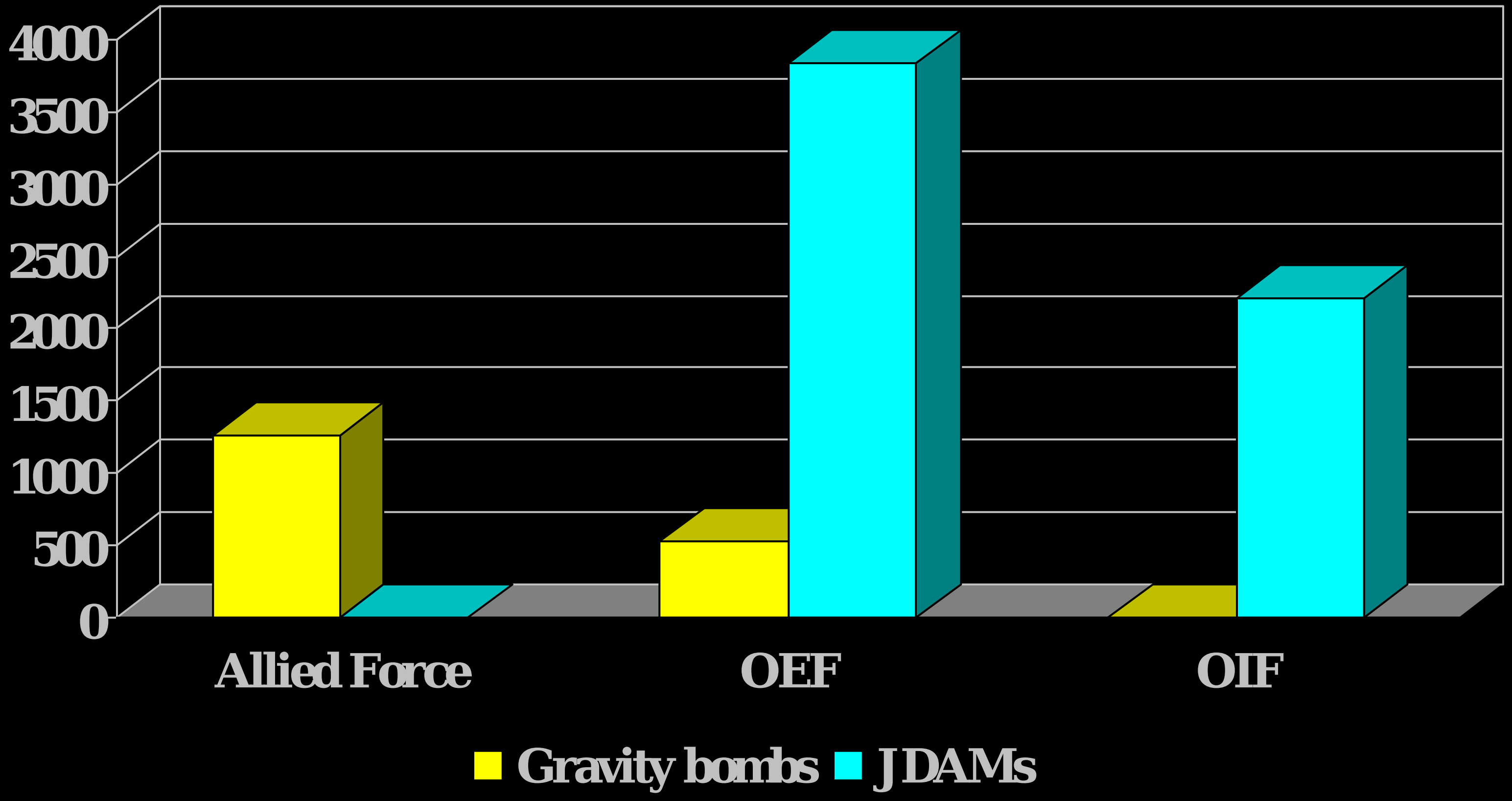
- Built base from scratch
- Start with some slabs of concrete
- Add equipment, combat CE and hard work
- Include services skills
- All the amenities of

GBU-31 JDAM

the Big Stick…

- Joint Direct Attack Munition
  - – GPS-Aided GP / Penetrator
  - – Weight: ~ 2000 Pounds
    - Mk-84 or BLU-109 Bomb Body
  - – Length: 12.7 Feet
  - – Guidance: INS / GPS-Aided
  - – Range: ~ 8 NM
- B-1 Carriage: 24
  - – 8 JDAM per Bay
  - – 3 versions (Impact, Air Burst, Penetrator

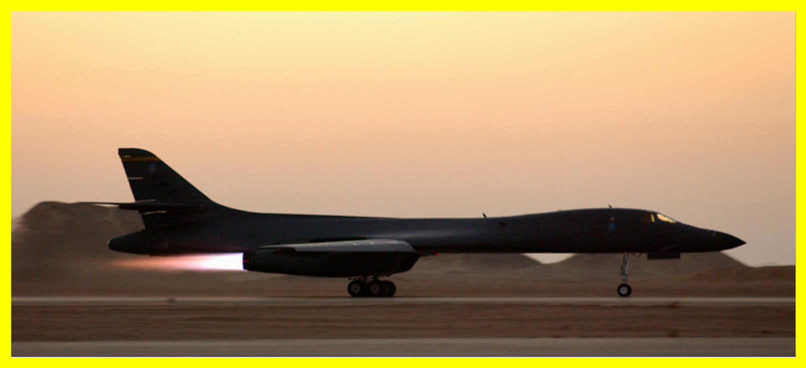
Weapons Expended *(Tons)*



Combat Performance

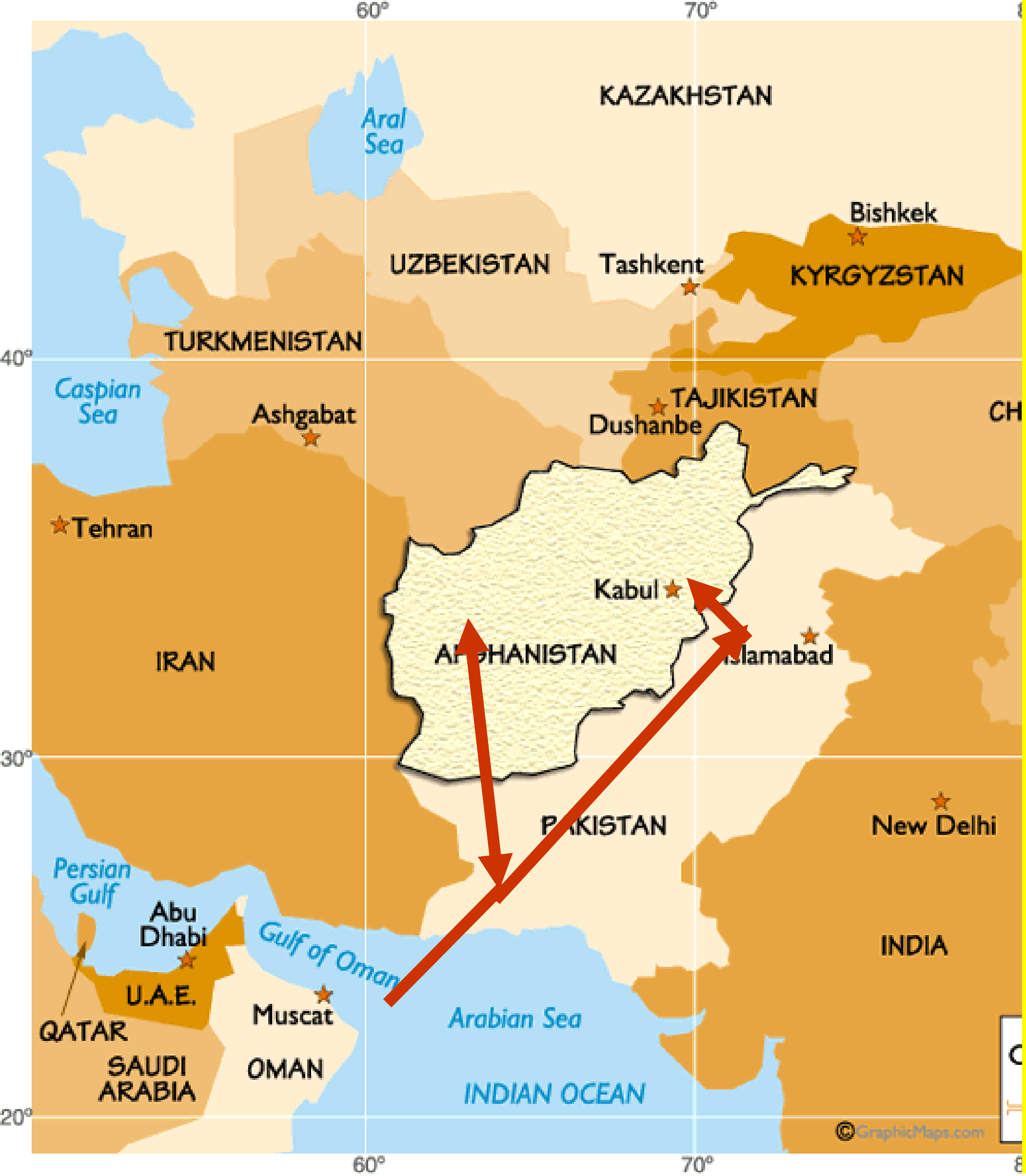
B-1 operations from Oman

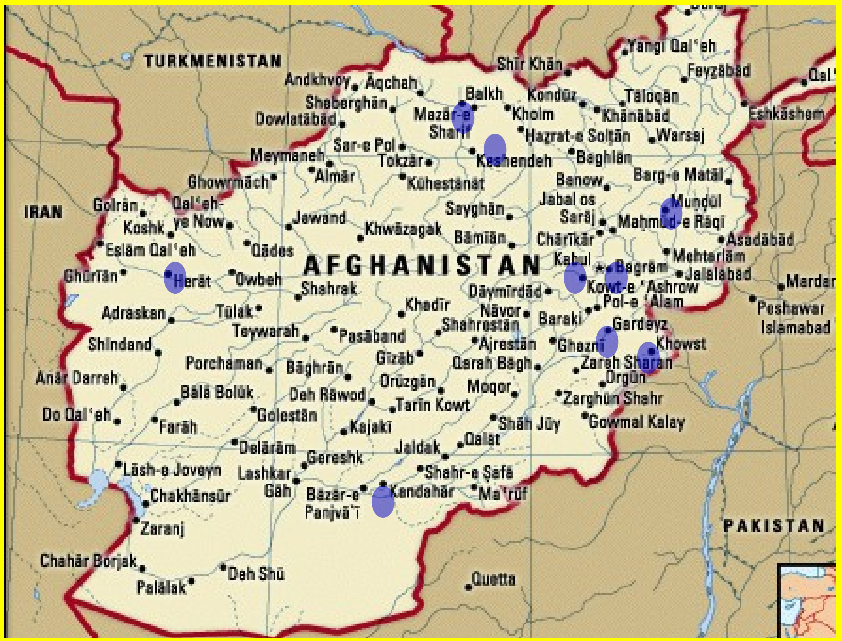
- Take-off fully loaded with 24 JDAM and climb to altitude
- 6 sortie surge with 3-4 sustained ops per ATO
- Enter into combat box
  - 2-5 hours on station
  - Usually one air refueling
- On-call for strategic attack, interdiction or CAS mission
- Also conducted **PSYOPS!**



UZBEKISTAN
KYRGYZSTAN
CHINA
TAJIKISTAN
TURKMENISTAN
Mazar-e Sharif
Taloqan
Dara-e-Suf
Bagram
Herat
Chaghcharan
Jalalabad
Kabul
Peshawar
Shindand
Islamabad
Moqor
Khyber Pass
AFGHANISTAN
Zaranj
Qandahar
INDIA
PAKISTAN
IRAN

OEF

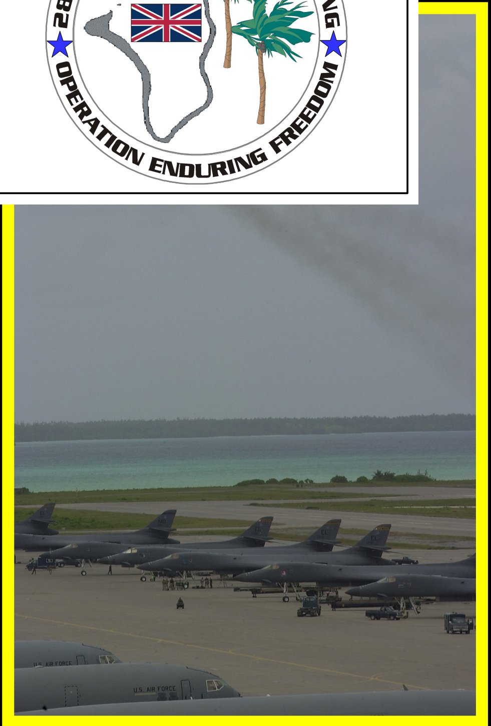

60°
70°
40°
30°
20°
KAZAKHSTAN
Aral Sea
Bishkek
UZBEKISTAN
Tashkent
KYRGYZSTAN
TURKMENISTAN
Caspian Sea
Ashgabat
TAJIKISTAN
Dushanbe
CH
Tehran
Kabul
IRAN
AFGHANISTAN
Islamabad
PAKISTAN
New Delhi
Persian Gulf
Abu Dhabi
Gulf of Oman
INDIA
U.A.E.
QATAR
Muscat
Arabian Sea
SAUDI ARABIA
OMAN
INDIAN OCEAN
©GraphicMaps.com


TURKMENISTAN
Andkhvoy
Āqchah
Balkh
Shīr Khān
Yangi Qal'eh
Feyzābād
Sheberghān
Mazār-e Sharīf
Kondūz
Tāloqān
Dowlatābād
Kholm
Khānābād
Eshkāshem
Sar-e Pol
Hazrat-e Soltān
Warsej
Meymaneh
Tokzār
Keshendeh
Baghlān
Ghowrmāch
Almār
Kūhestānāt
Banow
Barg-e Matāl
IRAN
Golrān
Qal'eh-ye Now
Jawand
Sayghān
Jabal os Sarāj
Mundūl
Koshk
Khwāzagak
Bāmīān
Chārīkār
Mahmūd-e Rāqī
Asadābād
Eslām Qal'eh
Qādes
AFGHANISTAN
Kabul
Bagrām
Mehtarlām
Jalālābād
Ghūrīān
Herāt
Owbeh
Shahrak
Daymīrdād
Kowt-e 'Ashrow
Mardan
Adraskan
Tūlak
Khadīr
Nāvor
Baraki
Pol-e 'Alam
Peshawar
Islamabad
Teywarah
Pasāband
Shahrestān
Gardeyz
Shīndand
Ajrestān
Ghazni
Khowst
Porchaman
Bāghrān
Gīzāb
Qarah Bāgh
Zareh Sharan
Anār Darreh
Bālā Bolūk
Orūzgān
Moqor
Orgūn
Deh Rāwod
Tarīn Kowt
Zarghūn Shahr
Do Qal'eh
Farāh
Golestān
Kajakī
Shāh Jūy
Gowmal Kalay
Delārām
Gereshk
Jaldak
Qalāt
Lāsh-e Joveyn
Lashkar Gāh
Shahr-e Şafā
Chakhānsūr
Bāzār-e Panjvā'ī
Kandahār
Ma'rūf
Zaranj
PAKISTAN
Chahār Borjak
Deh Shū
Quetta
Palālak

AIR COMBAT COMMAND

B-1 Operations from Diego Garcia

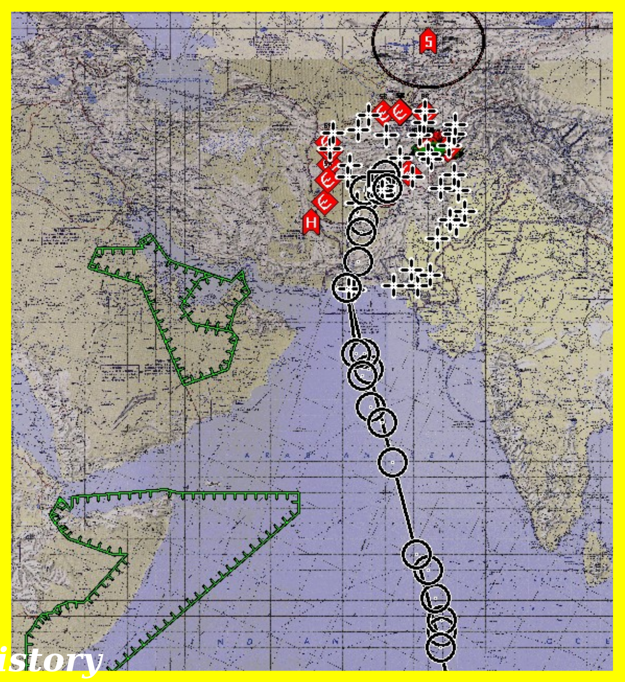
28th AIR EXPEDITIONARY WING
OPERATION ENDURING FREEDOM



Average Crew Duty Day:
- ***22 Hours***

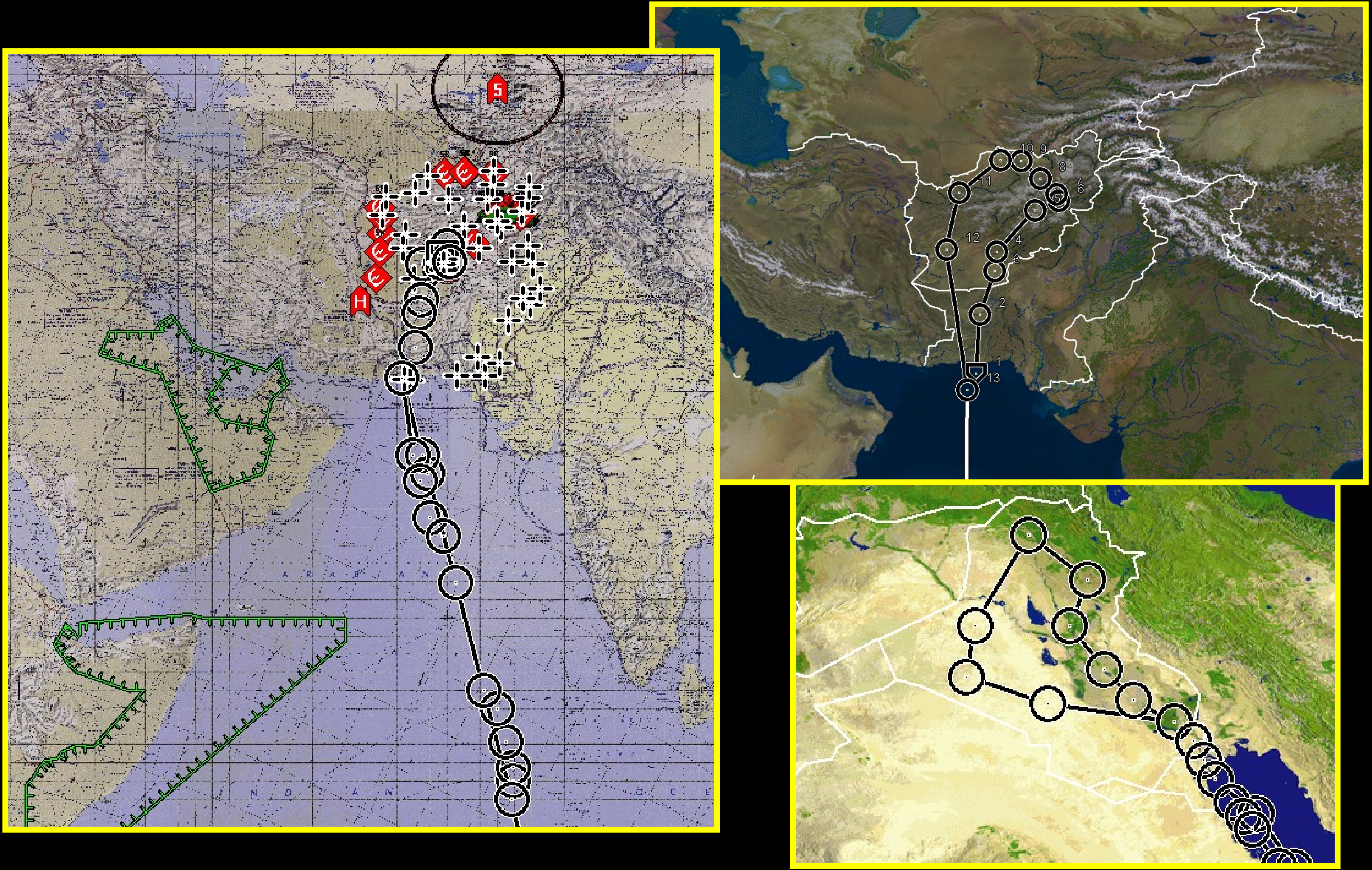
Load-Out
- ***16 JDAMs***
- ***1 Fwd Bay Tank***

Average Sortie Duration:
- ***16-18 Hours***
  - ***430k lbs. GW on Takeoff***
  - ***4-5 Hour Vul Coverage***
  - ***3 Midair Refuelings (90, 90, 65)***
  - ***Longest B-1 Combat Sortie in History***
    - ***21.3 Hours, 11 Hour Vul Period***



Mission Routing

Operation ENDURING FREEDOM & IRAQI FREEDOM…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H
A R A B I A N   S E A
I N D I A N   O C E
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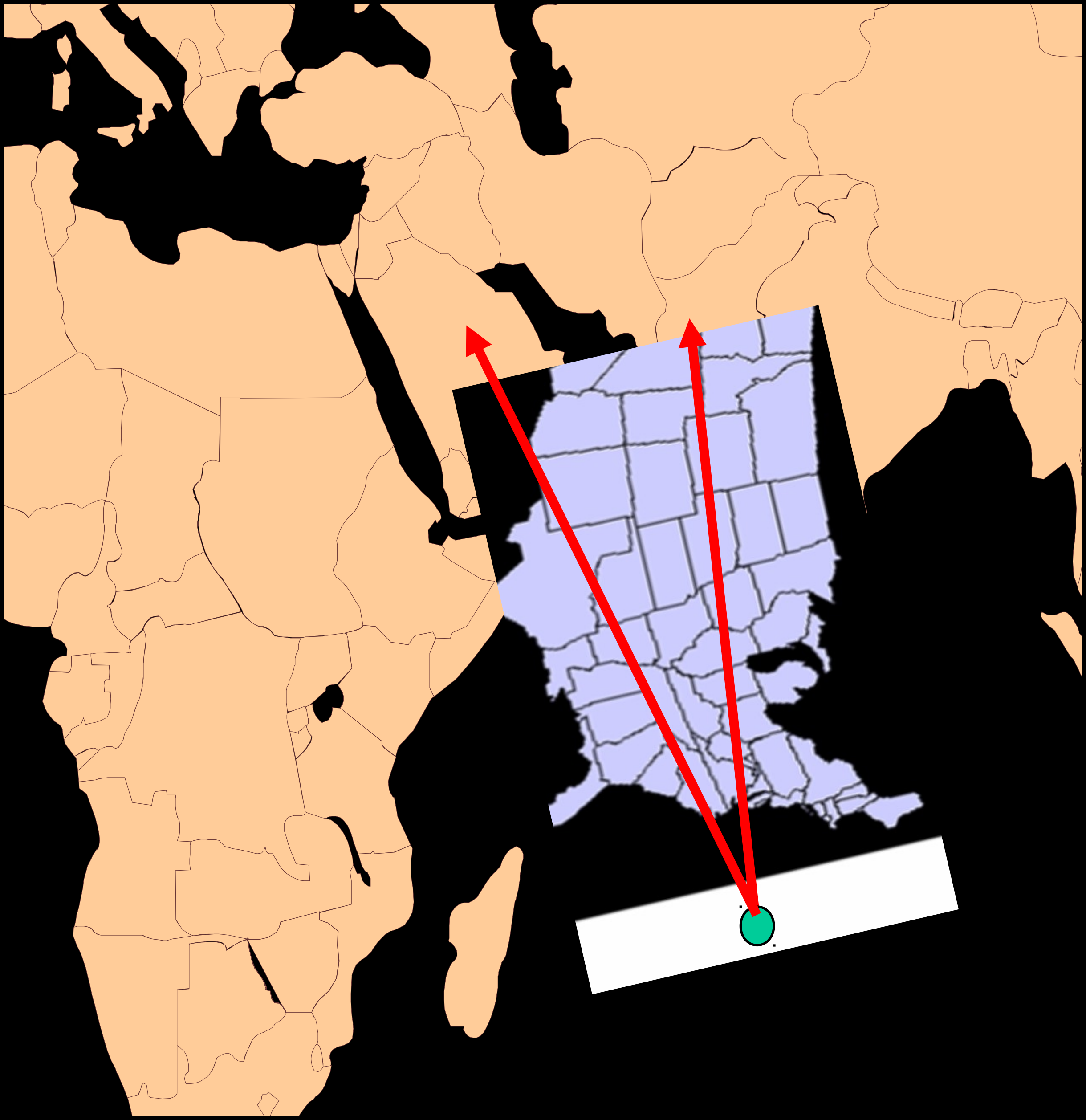
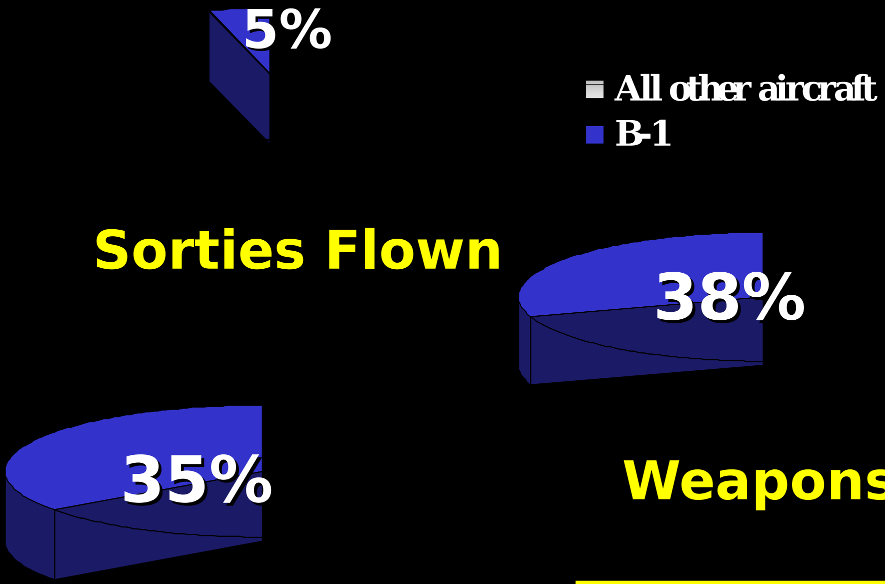
13

A Very Long Way….

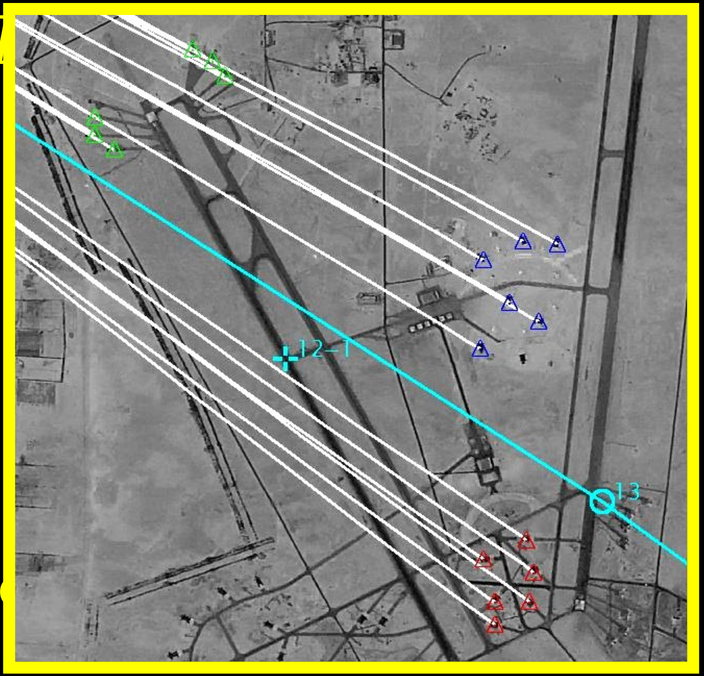


The BONE’s Contribution

Product of Precision and Payl



Targets Destroyed



“We’re not running out of targets, Afghanistan is…..” - Secretary of Defense Rumsfeld

Operation ENDURING FREEDOM

CFACC's Platform of Choice…

Weapons Dropped:

JDAMs	3660 *and rising*
Mk-82s	1,471
Mk-84s	135+
CBU-87	70

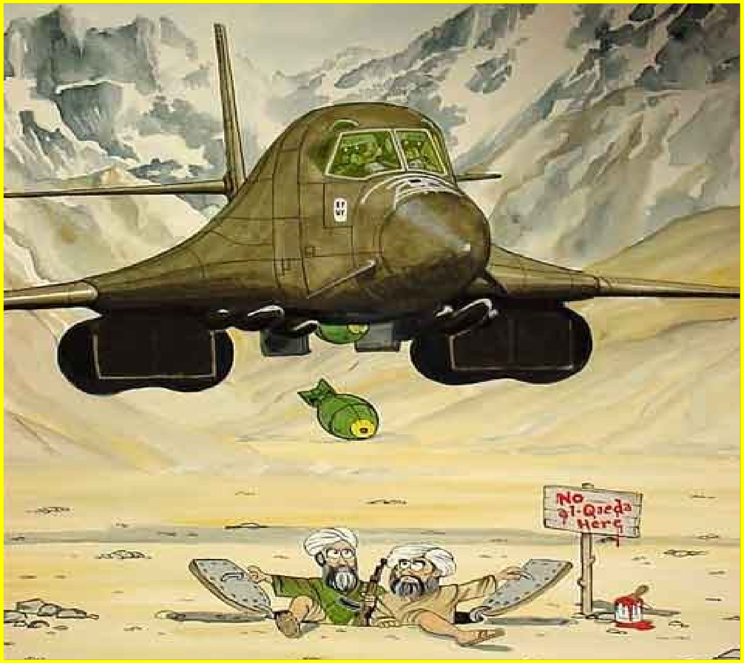
AFGANISTAN

	Tons Dropped	**%**
B-1	**3,438**	**41%**
B-52	**3,08932%**	
All Others	**2,53827%**	

Data through Feb 02

Adaptive Warfighting

- Transforming the B-1 during warfare
  - On Call CAS
  - Psyops
  - ISR
  - TST / Emerging Targets
    - Leadership, High Value, Strategic Effects
  - Strike Coordination and Reconnaissance (SCAR)



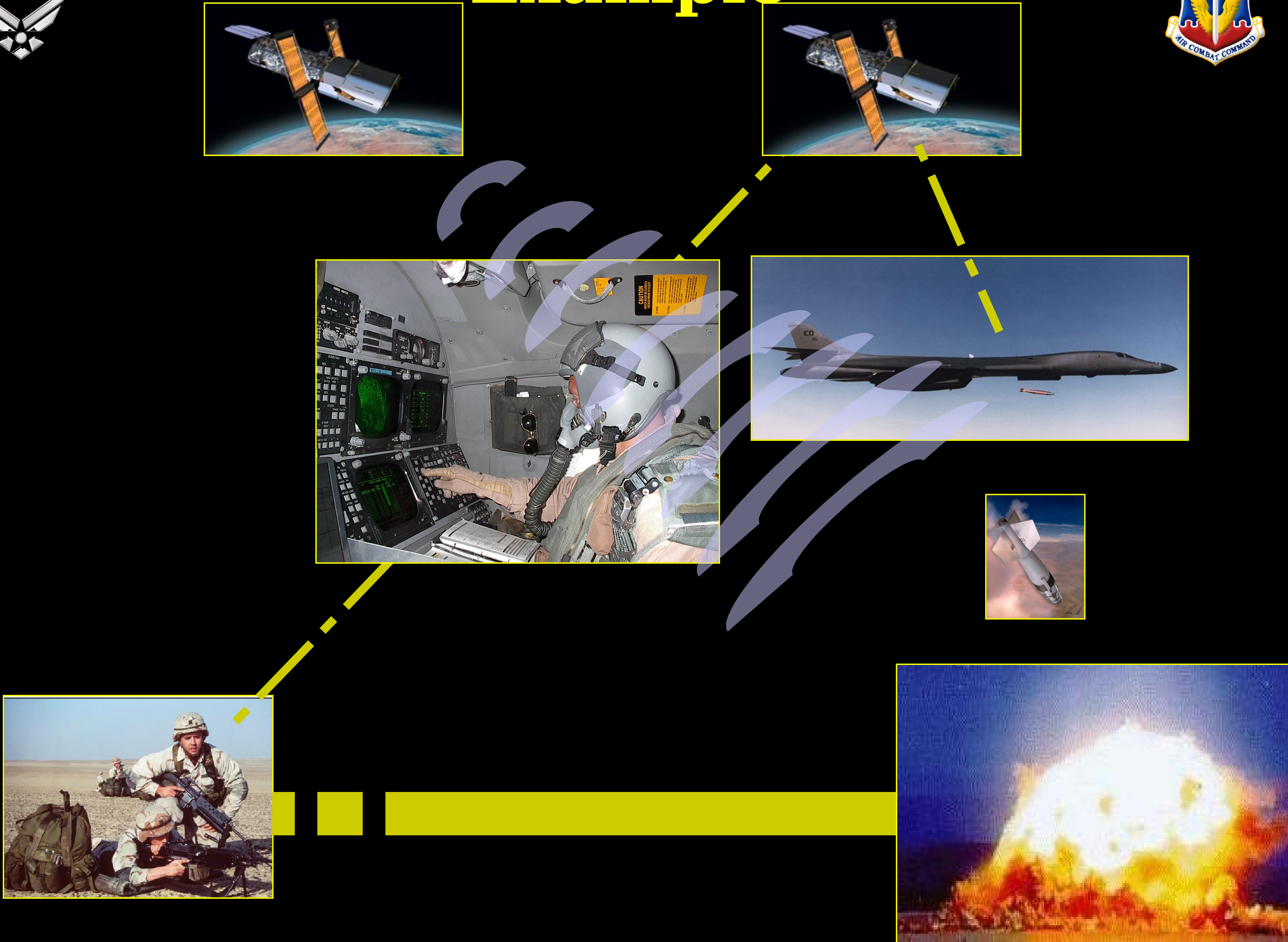
e of these missions were in the original concept of the

Revolutionary Tactics

Success based on marriage o

- Near-realtime updates with SATCOM
- Teaming with Special Forces
- GPS navigation and weapons delivery
- B-1 inherent capabilities (payload, range, speed & loiter)

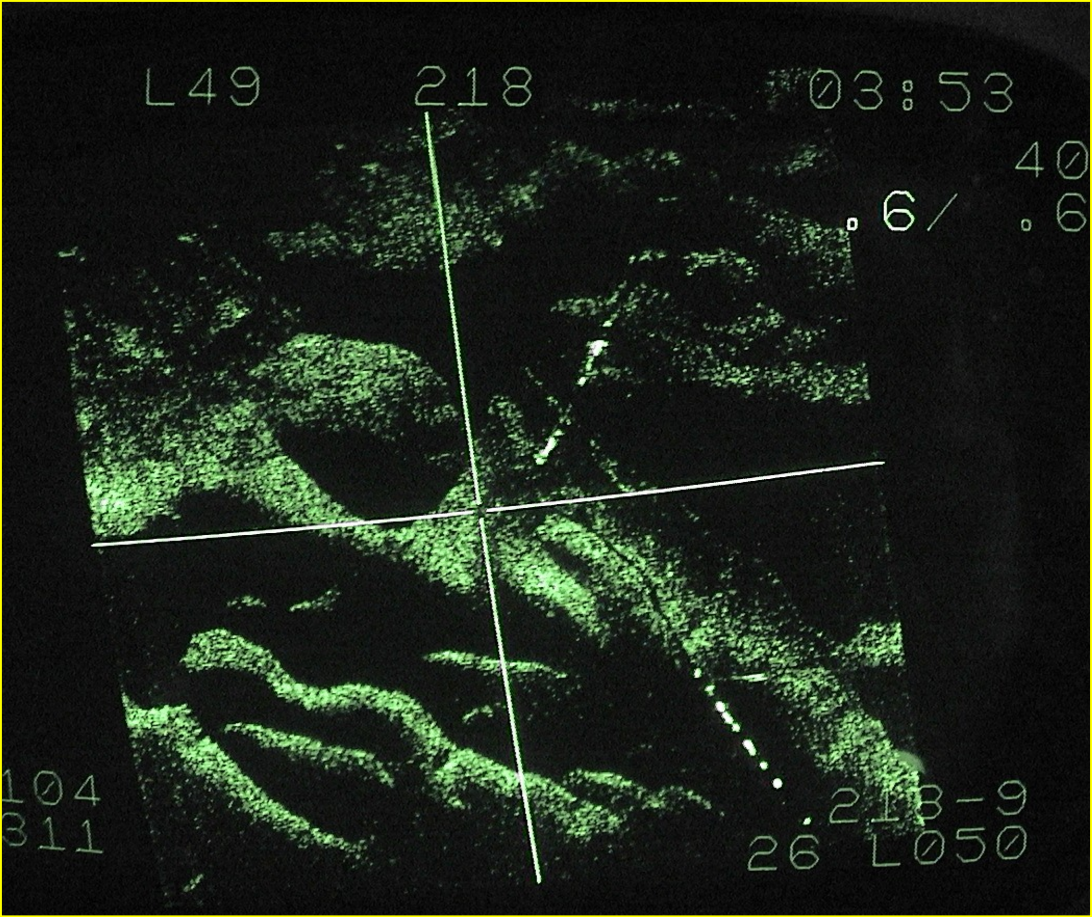
Example



On-Call CAS

Precision weapons gave the capability…

- **Integration of High-Res Radar and GFAC Key**
  - **Can drop on coordinates only; however, non-optimal**
- **GFAC makes bomber CAS possible**
  - **Radar talk on by GFAC common**

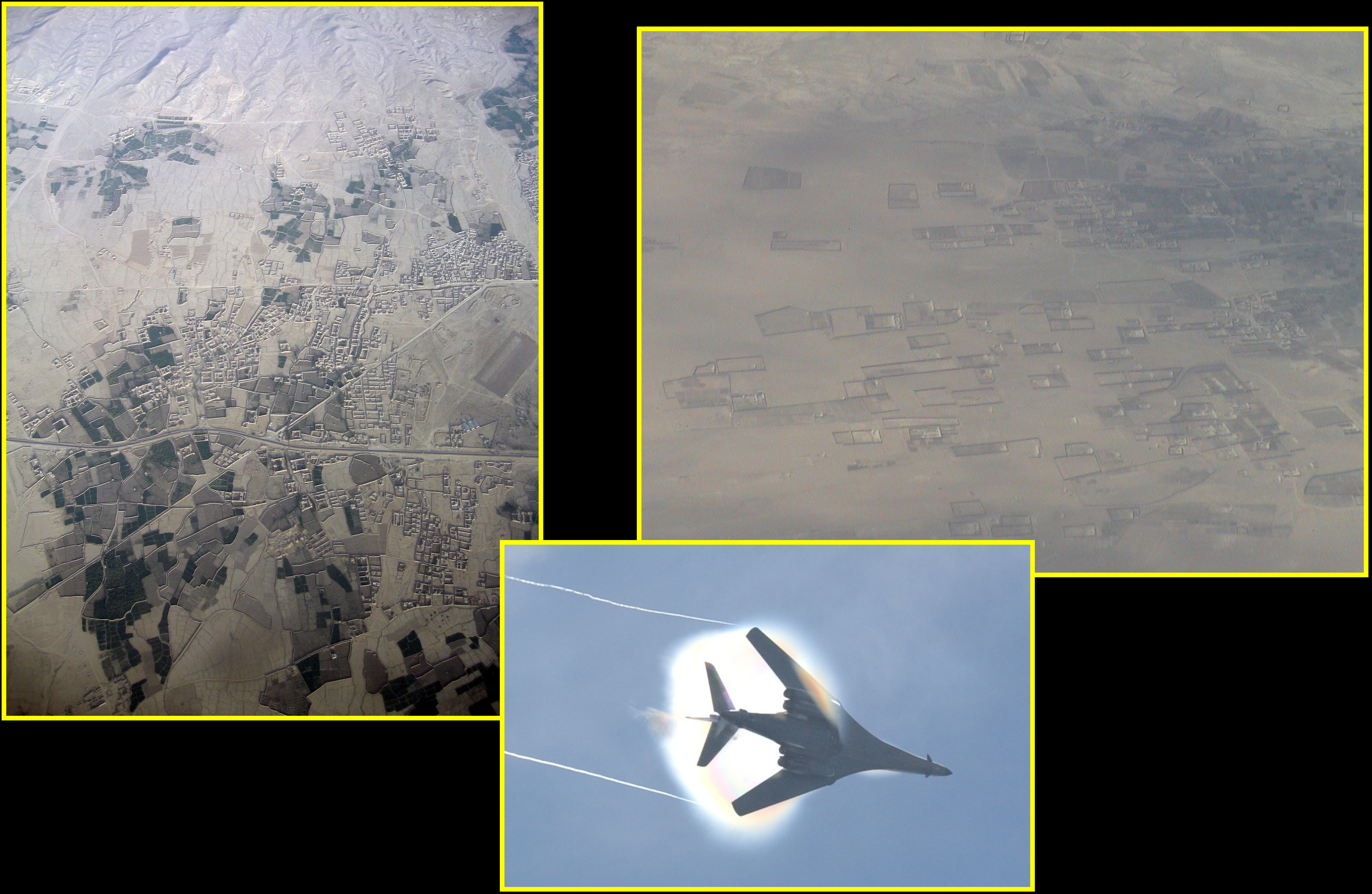

L49
218
03:53
40
.6/
.6
104
311
218-9
26
L050

Key striker during sand storms

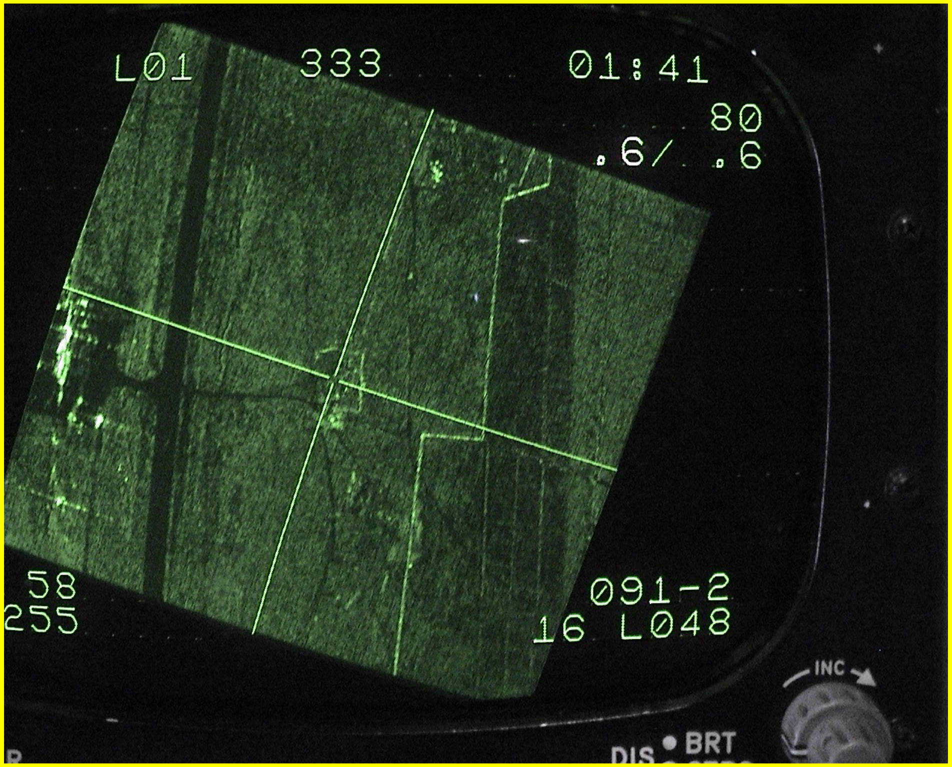
Laser-guided weapons unable to target during sand storms/inclement Wx

PSYOPS

A New Mission using a non-lethal weapon…



ISR


L01
333
01:41
80
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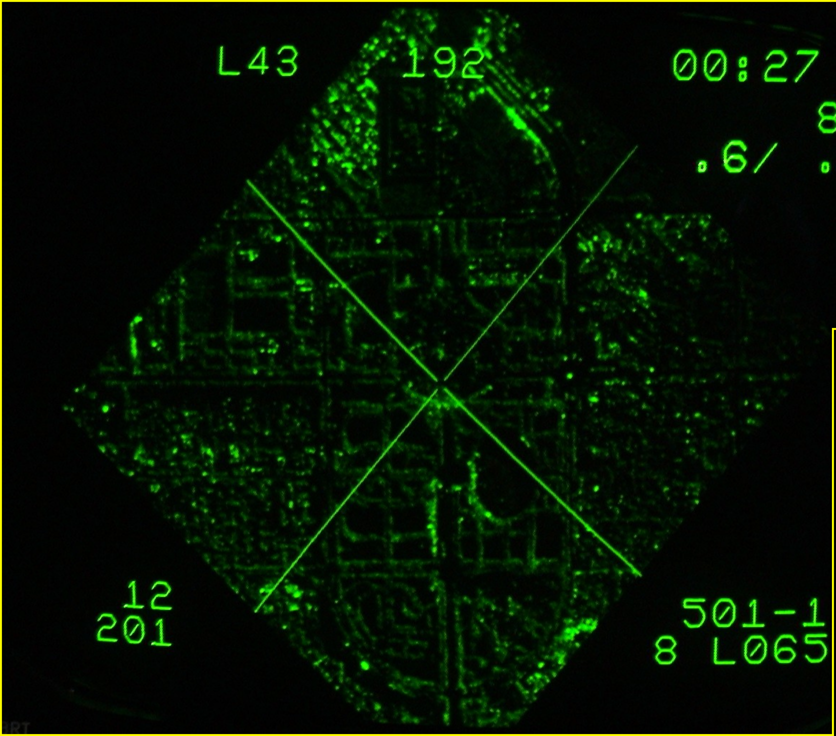
58
255
091-2
16 L048
INC
BRT
DIS

Combat Escort

Afghan President…


L43
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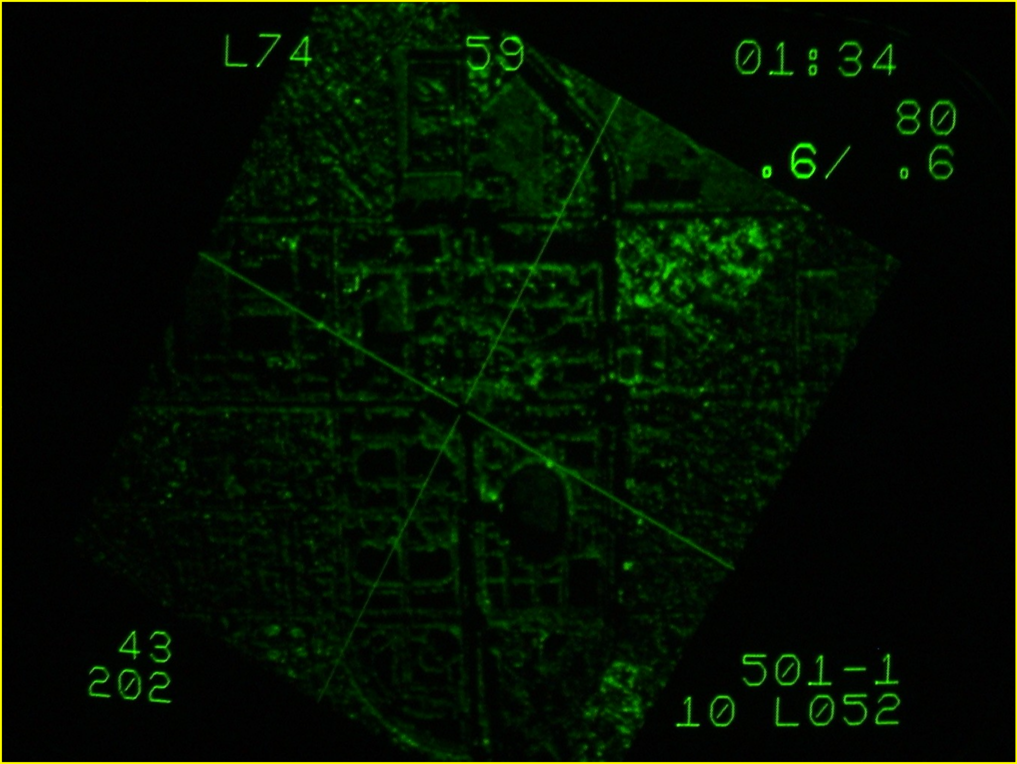
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59
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202
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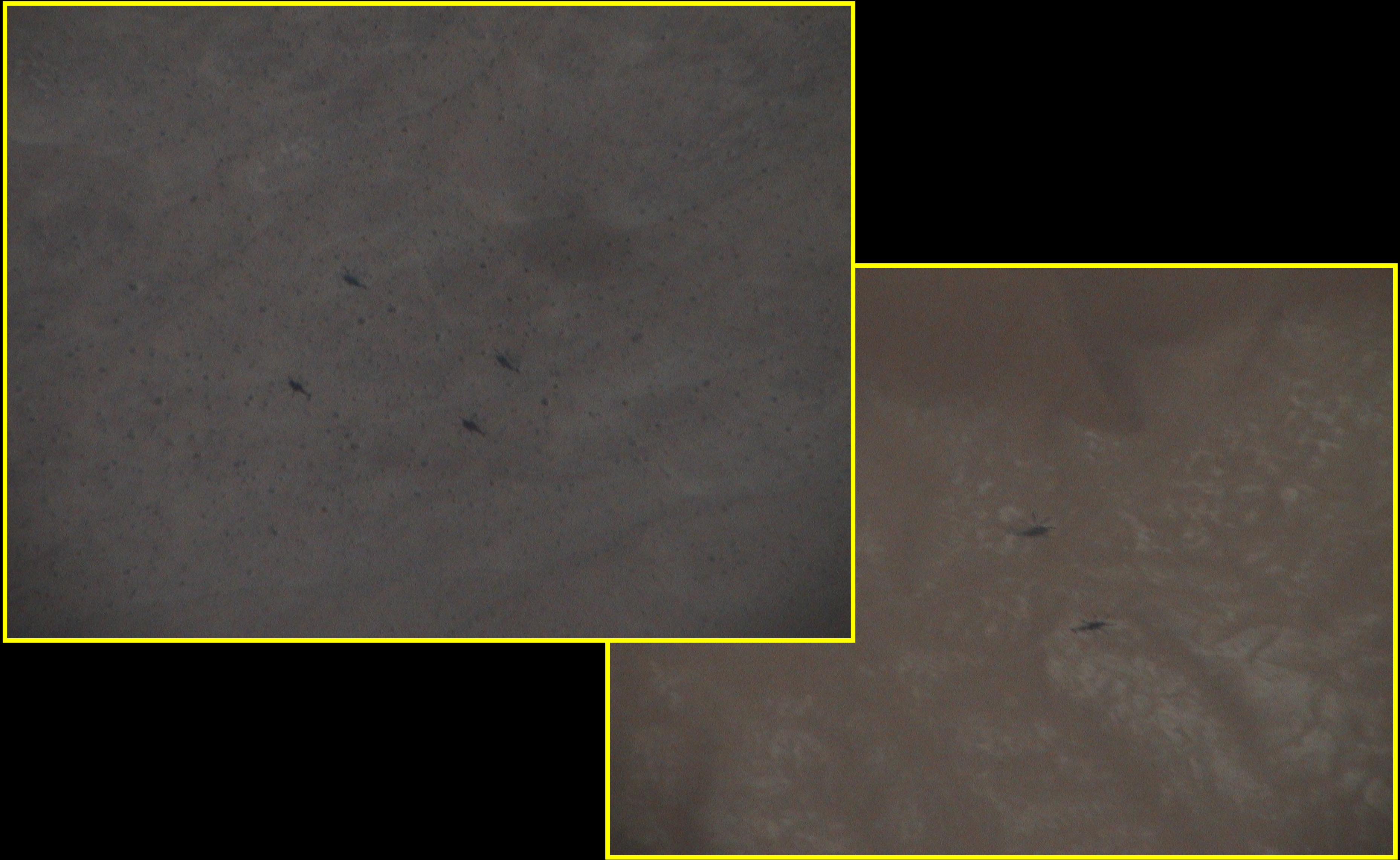
10 L052

Combat Escort

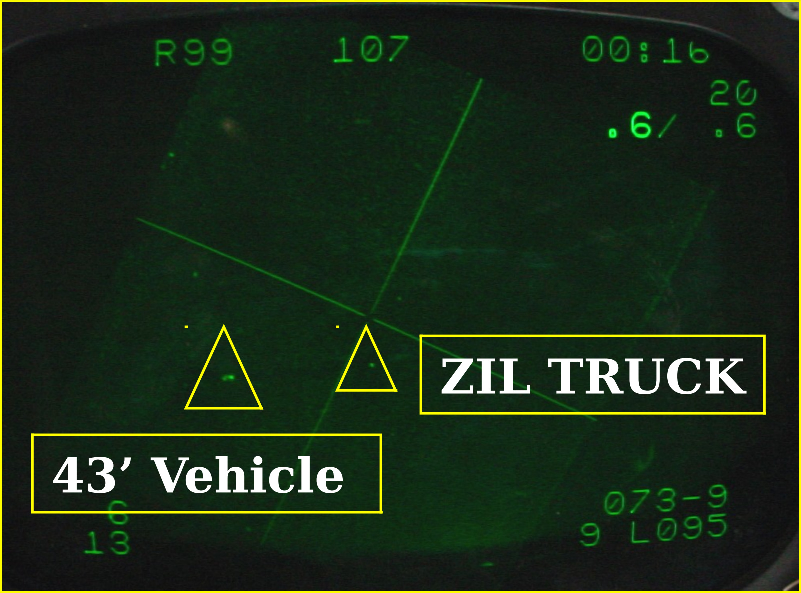
22 MEU…



TST / Emerging Targets

Leadership, High Value, Strategic Effects…

- Search for SCUD Launchers
- Detect and track suspicious movers



R99
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ZIL TRUCK
43’ Vehicle
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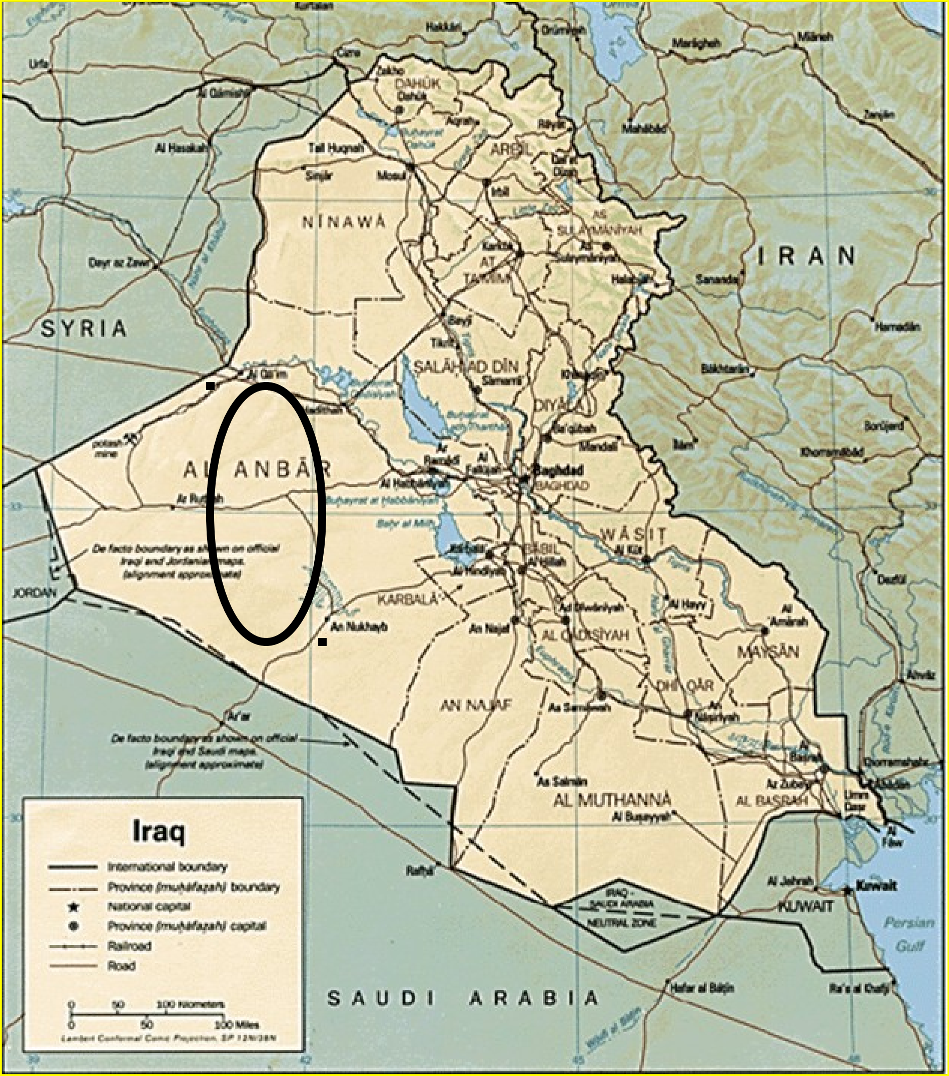
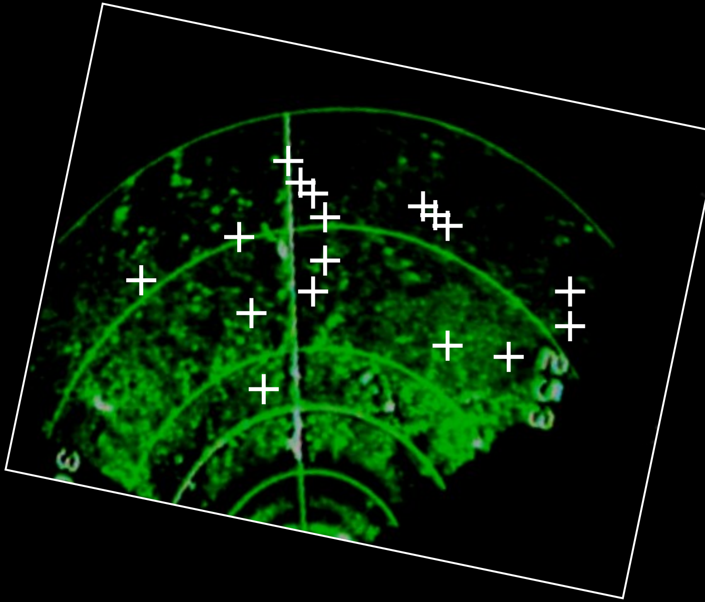
13
073-9
9 L095



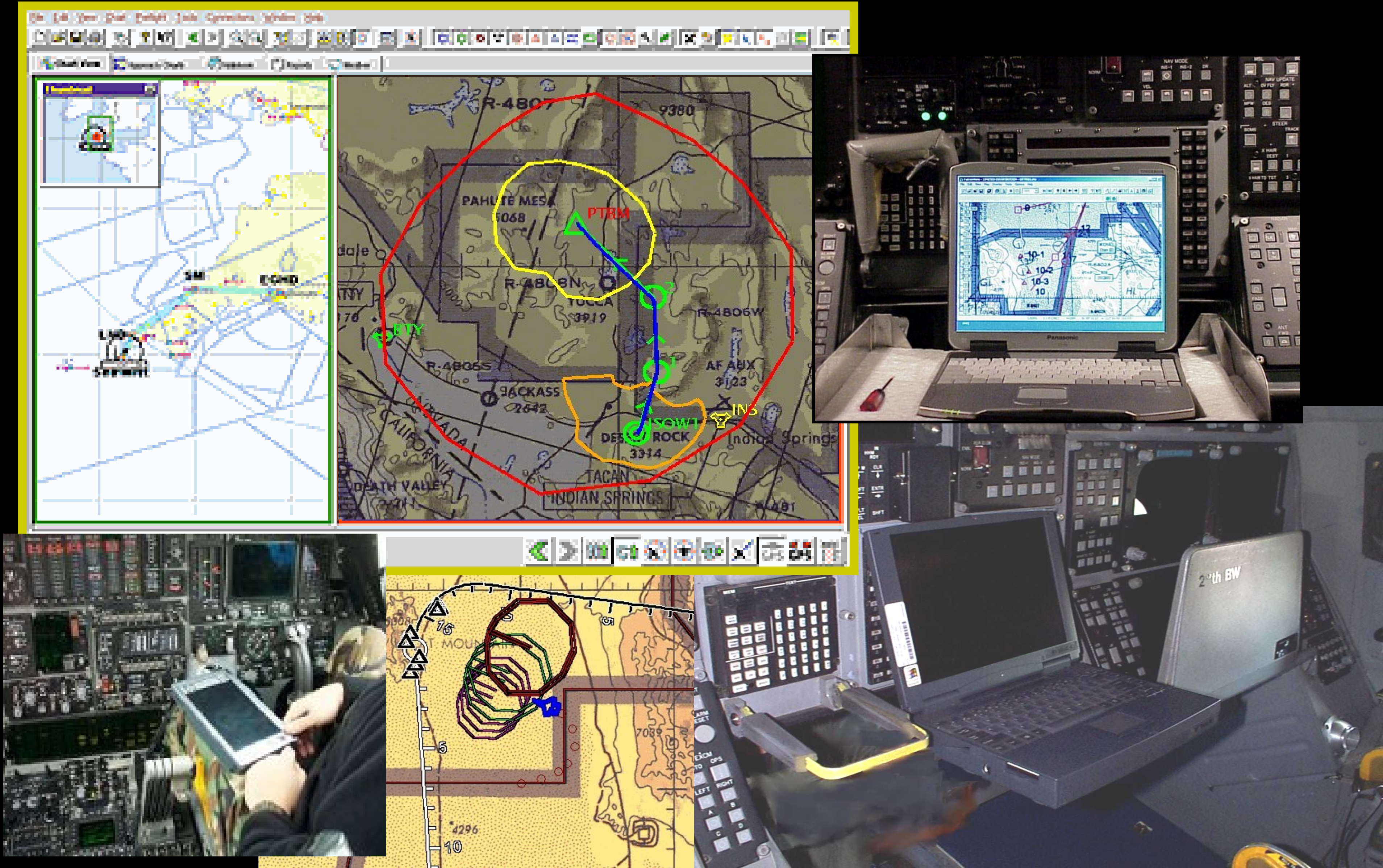
SYRIA
IRAN
SAUDI ARABIA
JORDAN
KUWAIT
Persian Gulf
NINAWA
AL ANBAR
SALAH AD DIN
DIYALA
AT TA'MIM
AS SULAYMANIYAH
ARBIL
DAHUK
WASIT
KARBALA
BABIL
AL QADISIYAH
AN NAJAF
DHI QAR
MAYSAN
AL MUTHANNA
AL BASRAH
Baghdad
De facto boundary as shown on official Iraqi and Jordanian maps. (alignment approximate)
De facto boundary as shown on official Iraqi and Saudi maps. (alignment approximate)
IRAQ - SAUDI ARABIA NEUTRAL ZONE
Iraq
International boundary
Province (muhafazah) boundary
National capital
Province (muhafazah) capital
Railroad
Road
0 50 100 Kilometers
0 50 100 Miles
Lambert Conformal Conic Projection, SP 12N/38N

Strike Coordination and Reconnaissance (SCAR)...

- **Scud Hunting**
  - B-1s assigned 2-hour search patterns
  - Ground Moving Target Indicator (GMTI)
    - Detect vehicles moving between 5-75 MPH
  - Monopulse Measurement (MM)
    - Derives coordinates of designated radar return
  - Pass vehicle information to another aircraft with PID Capability
  - ***B-1 limited to non-precision strike for moving Tgts (Blk D)***
    - ***Impacted mission weapons load***

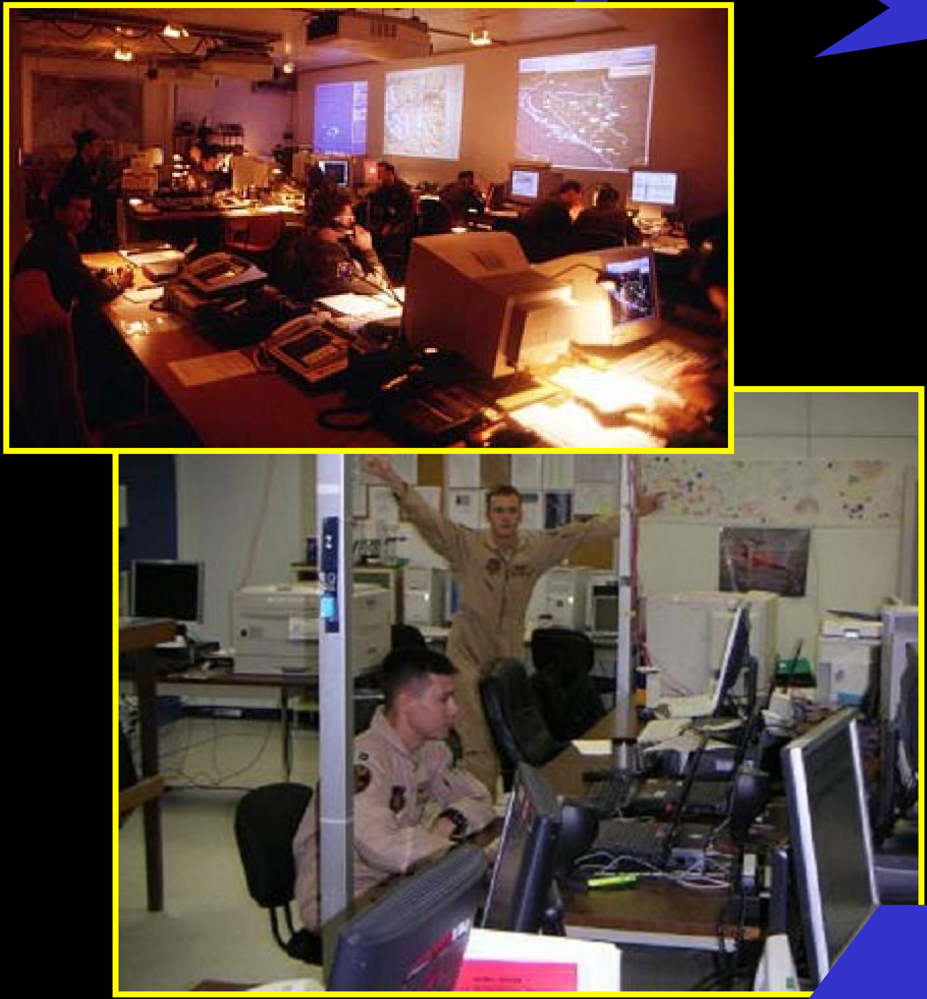


Modern Mission Planning

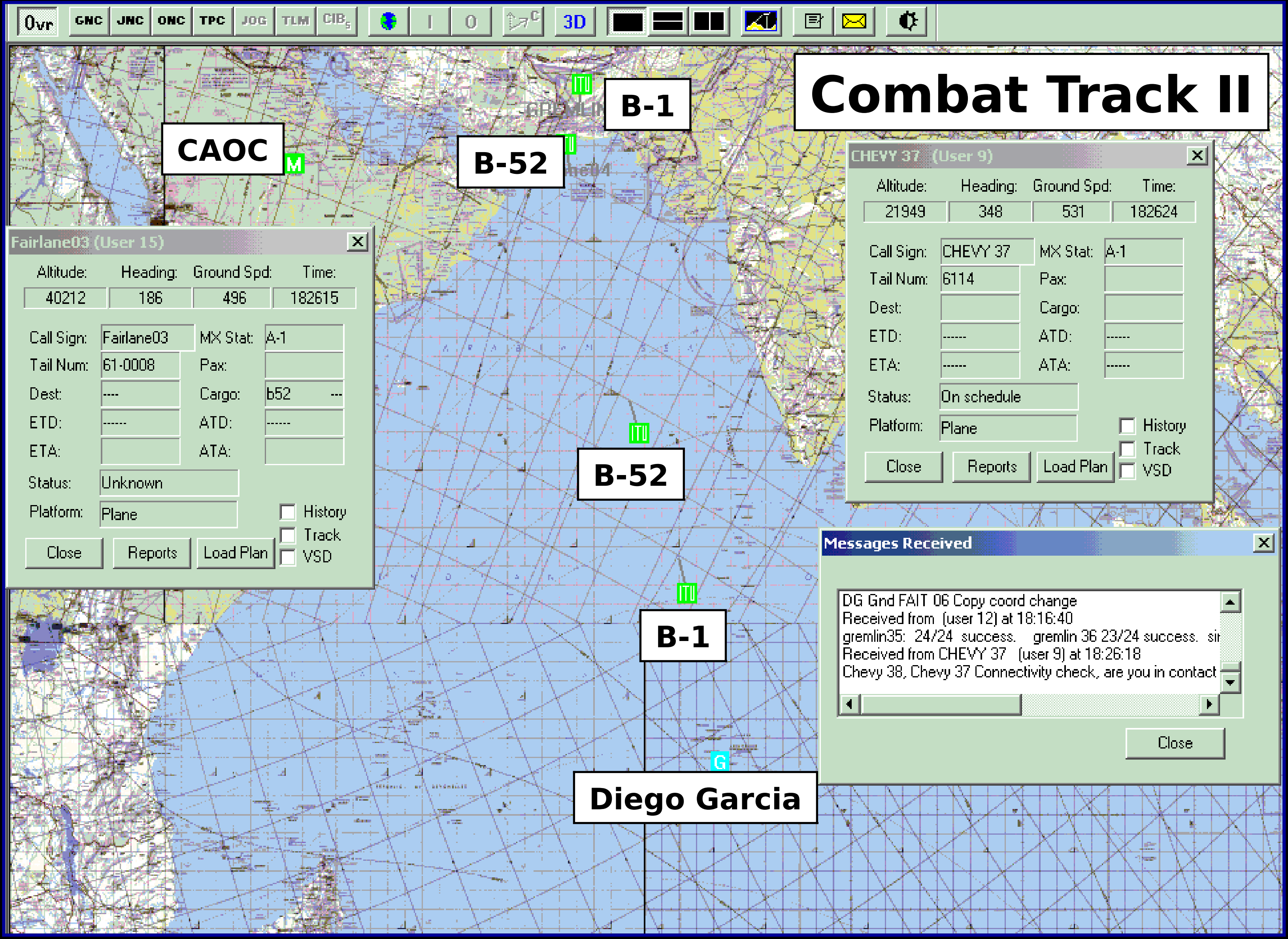

R-4807
9380
PAHUTE MESA
5068
PTBM
R-4808N
YUCCA
3919
R-4806W
BTY
AF AUX
3123
R-4806S
JACKASS
2642
SOW1
INS
DESERT ROCK
3314
Indian Springs
CALIFORNIA
NEVADA
DEATH VALLEY
TACAN
INDIAN SPRINGS
10-1
10-2
10-3
4296
7089
2nd BW

7th OSS

Combat Mission Planning Experts…



Modern Mission Planning


Ovr
GNC
JNC
ONC
TPC
JOG
TLM
CIB5
I
0
3D
Combat Track II
CAOC
M
B-1
B-52
B-52
B-1
G
Diego Garcia
Close
Reports
Load Plan
Close
Reports
Load Plan
Close

Fairlane03 (User 15)

Altitude:	Heading:	Ground Spd:	Time:
40212	186	496	182615

Call Sign:	Fairlane03	MX Stat:	A-1
Tail Num:	61-0008	Pax:	
Dest:	----	Cargo:	b52 ---
ETD:	------	ATD:	------
ETA:		ATA:	
Status:	Unknown		
Platform:	Plane		

☐ History
☐ Track
☐ VSD

CHEVY 37 (User 9)

Altitude:	Heading:	Ground Spd:	Time:
21949	348	531	182624

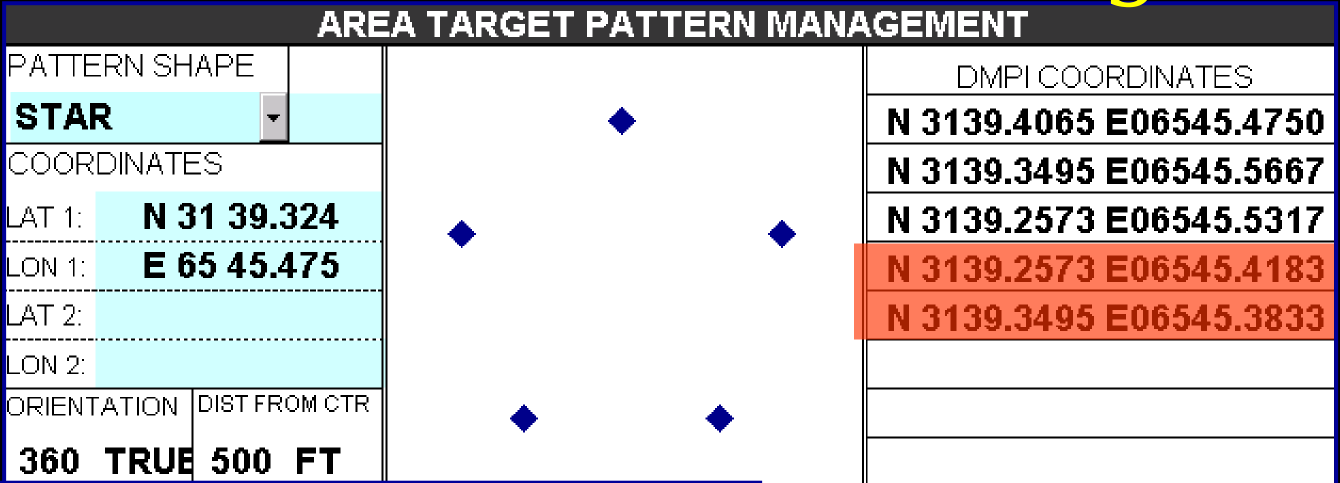
Call Sign:	CHEVY 37	MX Stat:	A-1
Tail Num:	6114	Pax:	
Dest:		Cargo:	
ETD:	------	ATD:	------
ETA:	------	ATA:	------
Status:	On schedule		
Platform:	Plane		

☐ History
☐ Track
☐ VSD

Messages Received

DG Gnd FAIT 06 Copy coord change
Received from (user 12) at 18:16:40
gremlin35: 24/24 success. gremlin 36 23/24 success. sir
Received from CHEVY 37 (user 9) at 18:26:18
Chevy 38, Chevy 37 Connectivity check, are you in contact

Modern Mission Planning



AREA TARGET PATTERN MANAGEMENT

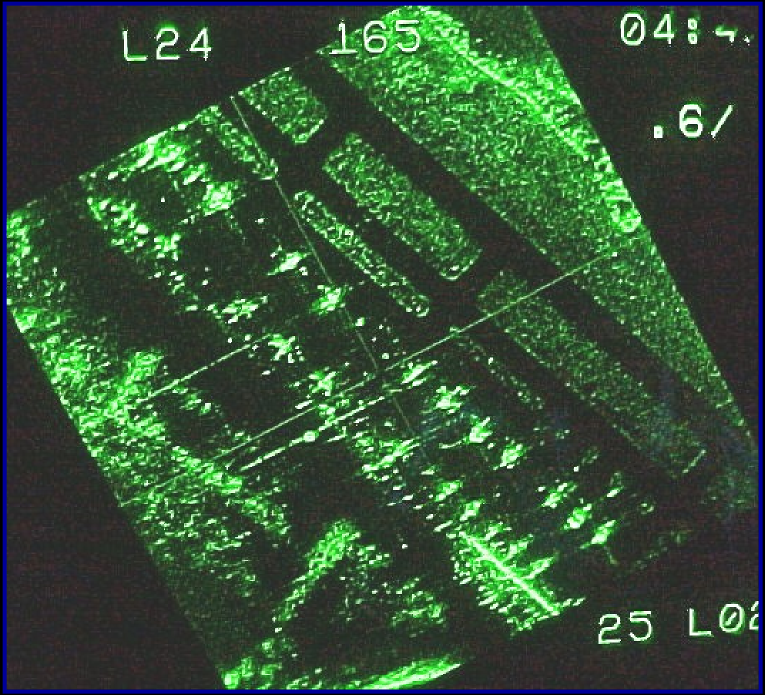
PATTERN SHAPE: **STAR**

COORDINATES

LAT 1:	**N 31 39.324**
LON 1:	**E 65 45.475**
LAT 2:	
LON 2:	

ORIENTATION	DIST FROM CTR
360 TRUE	**500 FT**

DMPI COORDINATES
N 3139.4065 E06545.4750
N 3139.3495 E06545.5667
N 3139.2573 E06545.5317
N 3139.2573 E06545.4183
N 3139.3495 E06545.3833

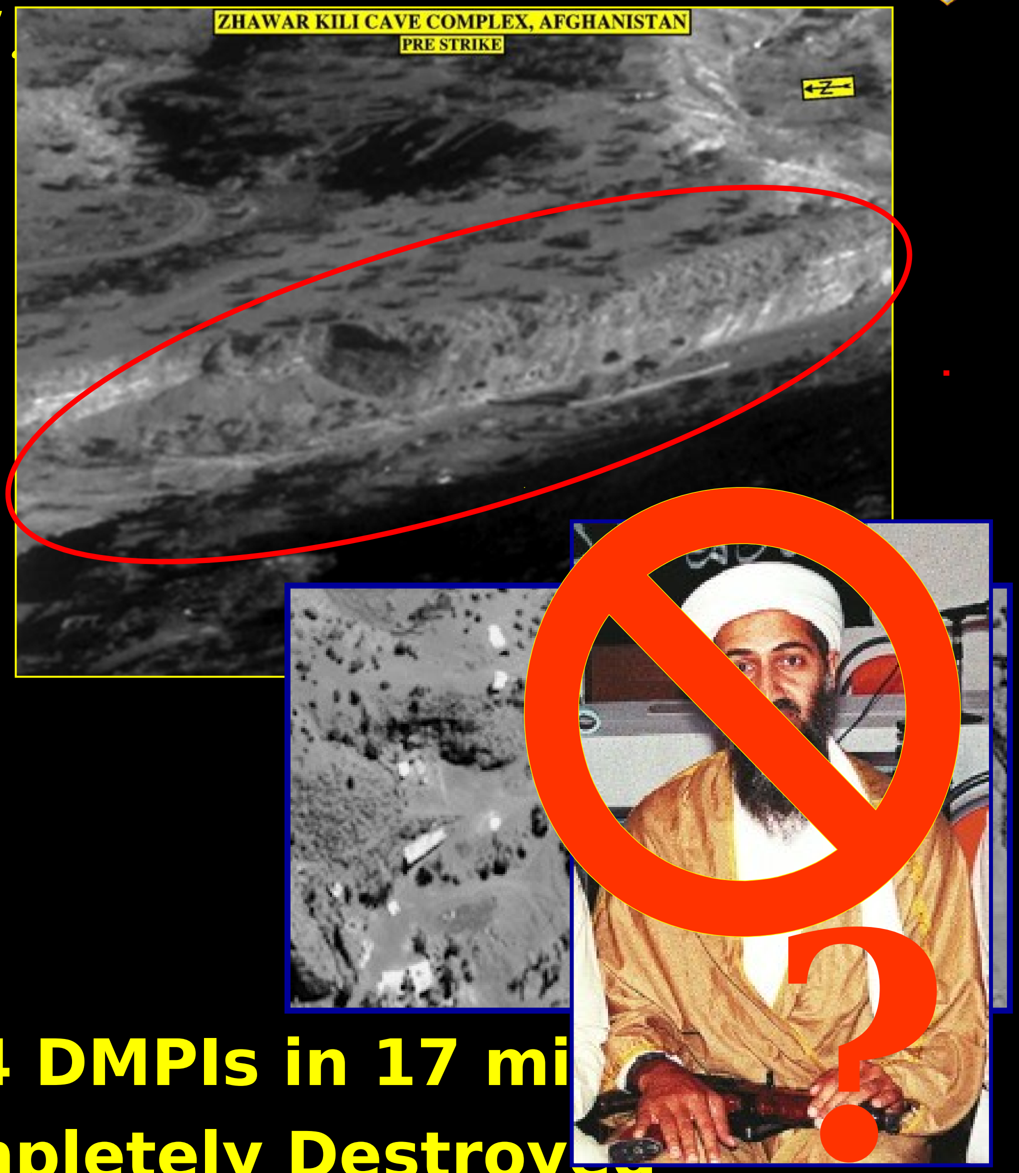


OEF BDA

Zawar Kili

Aka “TORA BORA”

- 3 Jan 02
- Largest PGM strike
  - 4 x B-1 (96 JDAM)
  - 4 x F-18 (8 JDAM)
  - 2 x Predator
  - 2 x AC-130


ZHAWAR KILI CAVE COMPLEX, AFGHANISTAN
PRE STRIKE
N
?

- **Results:**
  - **101 GBU-31s on 84 DMPIs in 17 mi**
  - **Cave Complex Completely Destroyed**

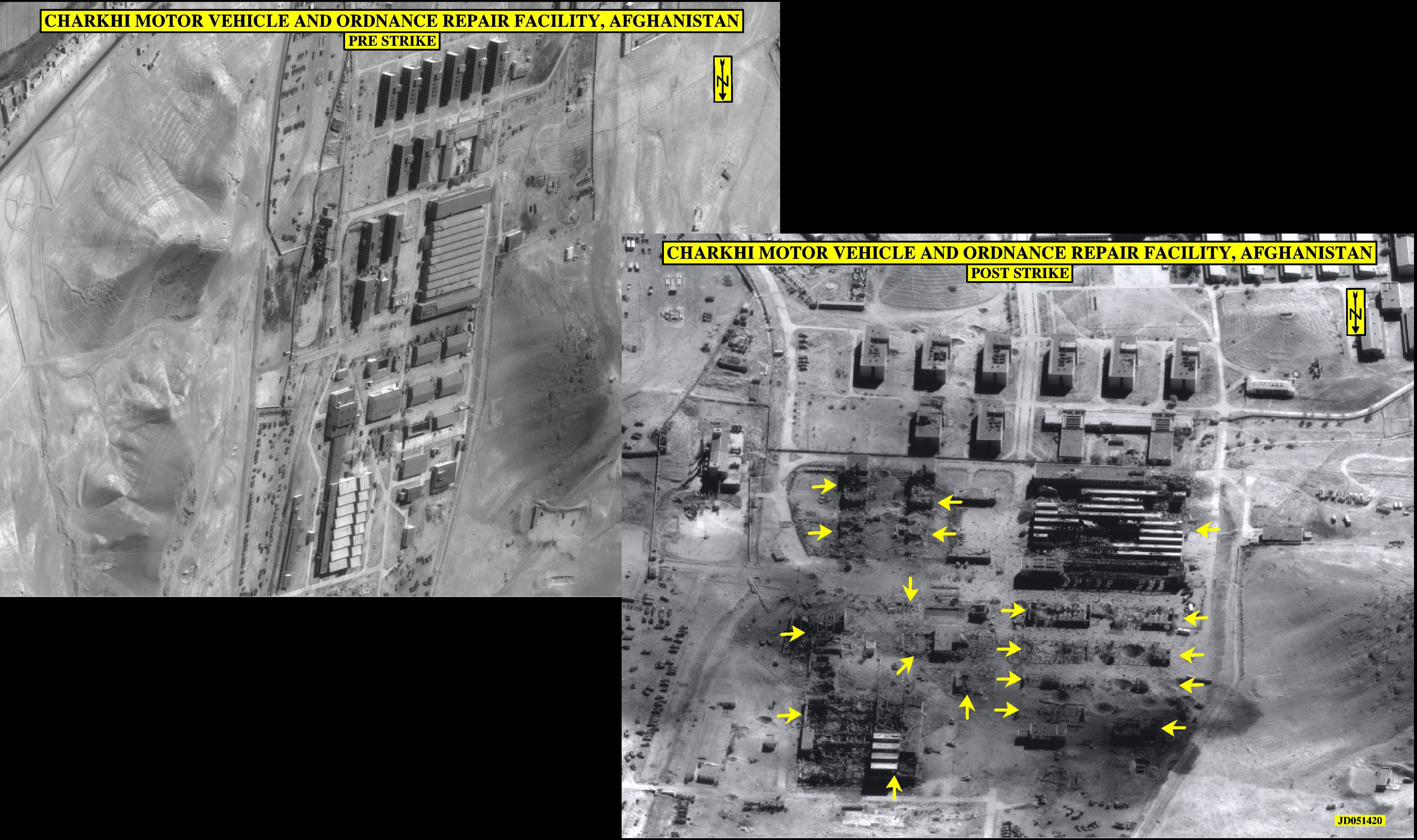
Operation ANACONDA

- **Delivered 850+ JDAMs**
- **First-ever B-1B conventional alert; became CENTCOM's top choice for emergency support**
- **Weapons troops loaded 24 JDAMs in 26 minutes- shattering old record of 35 minutes**

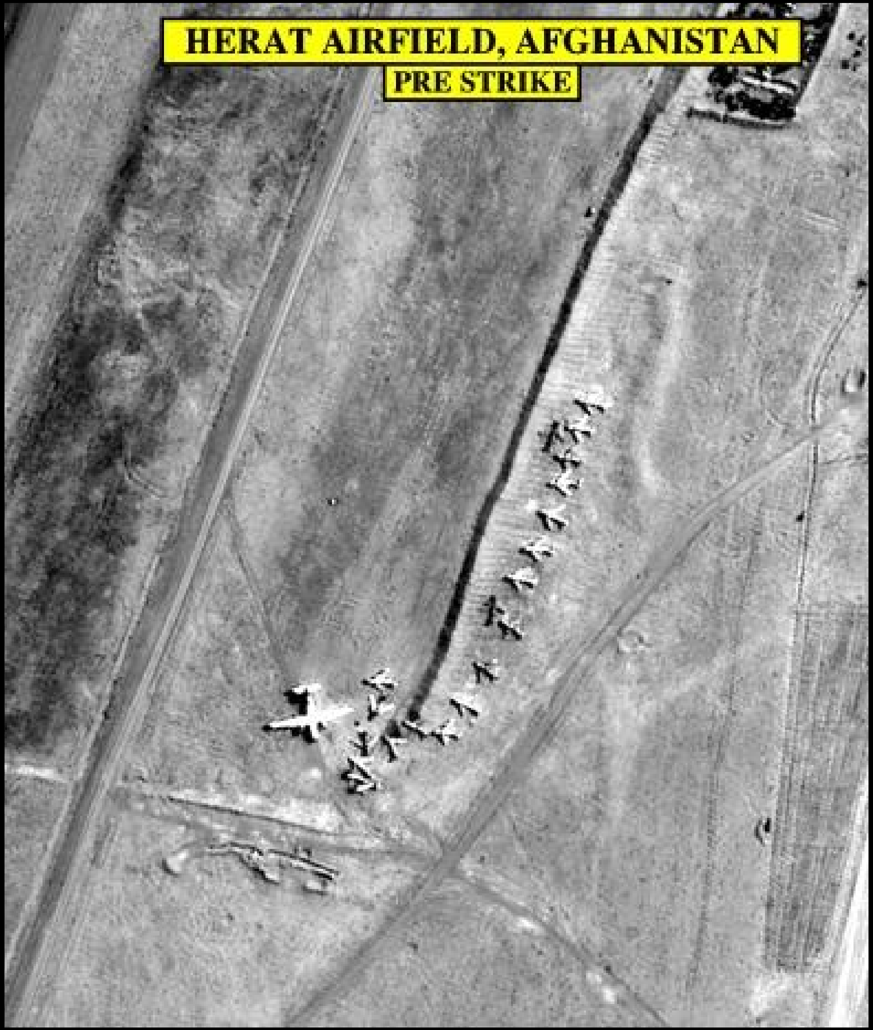
OEF BDA

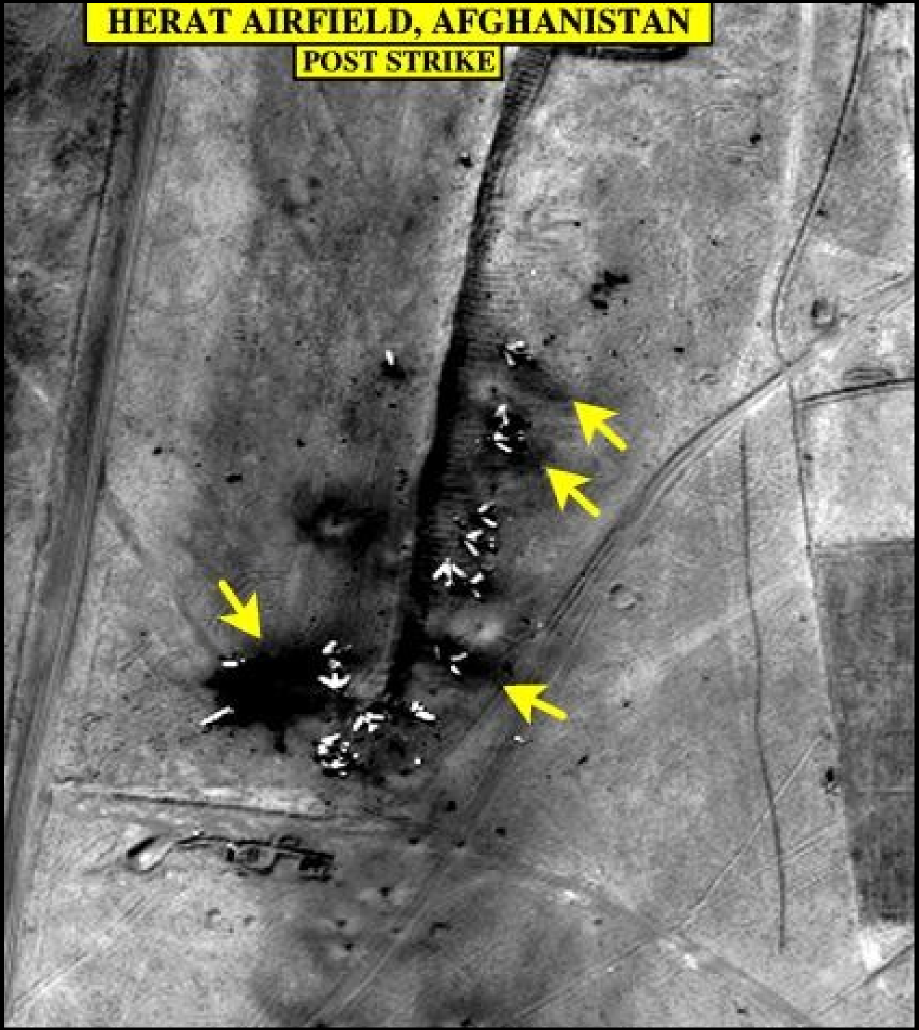
DEADLY
INTENTIONS

Incredible Results

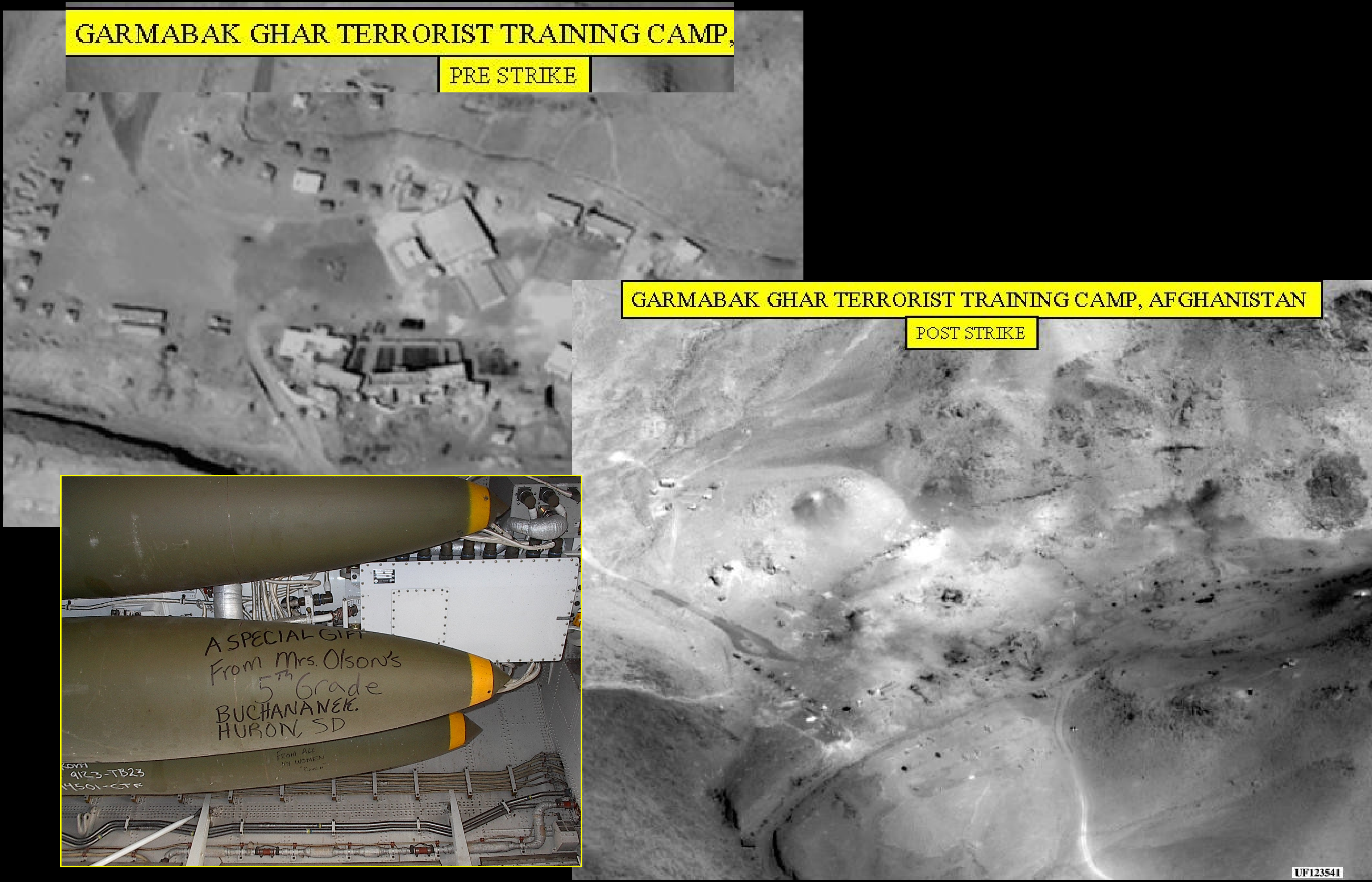

CHARKHI MOTOR VEHICLE AND ORDNANCE REPAIR FACILITY, AFGHANISTAN
PRE STRIKE
N
CHARKHI MOTOR VEHICLE AND ORDNANCE REPAIR FACILITY, AFGHANISTAN
POST STRIKE
N
JD051420

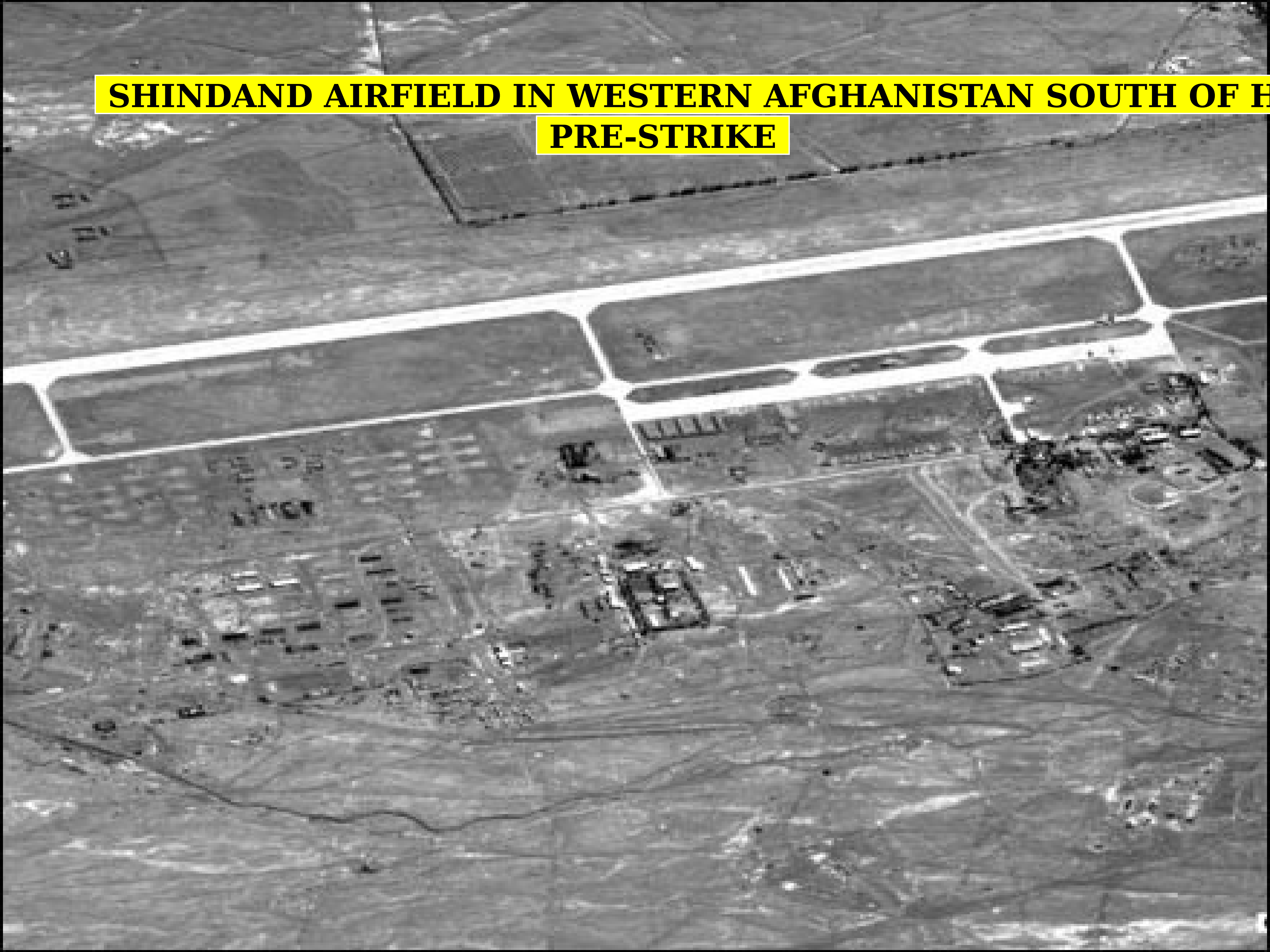
Incredible Results


HERAT AIRFIELD, AFGHANISTAN
PRE STRIKE


HERAT AIRFIELD, AFGHANISTAN
POST STRIKE

Incredible Results

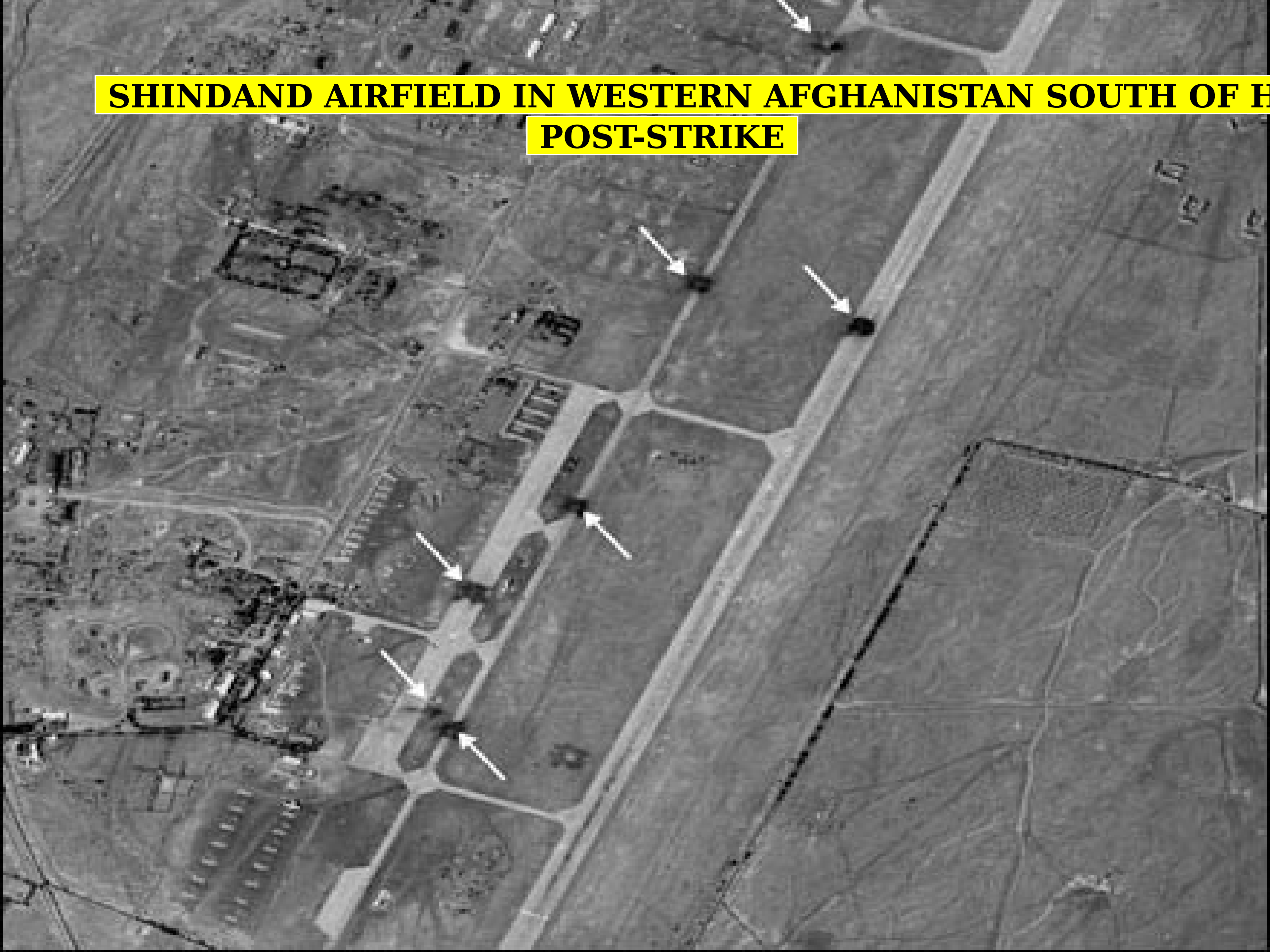

GARMABAK GHAR TERRORIST TRAINING CAMP,
PRE STRIKE
GARMABAK GHAR TERRORIST TRAINING CAMP, AFGHANISTAN
POST STRIKE
UF123541
A SPECIAL GIFT
From Mrs. Olson's
5th Grade
BUCHANAN ELE.
HURON, SD
9123-TB23
4501-CTF



SHINDAND AIRFIELD IN WESTERN AFGHANISTAN SOUTH OF H

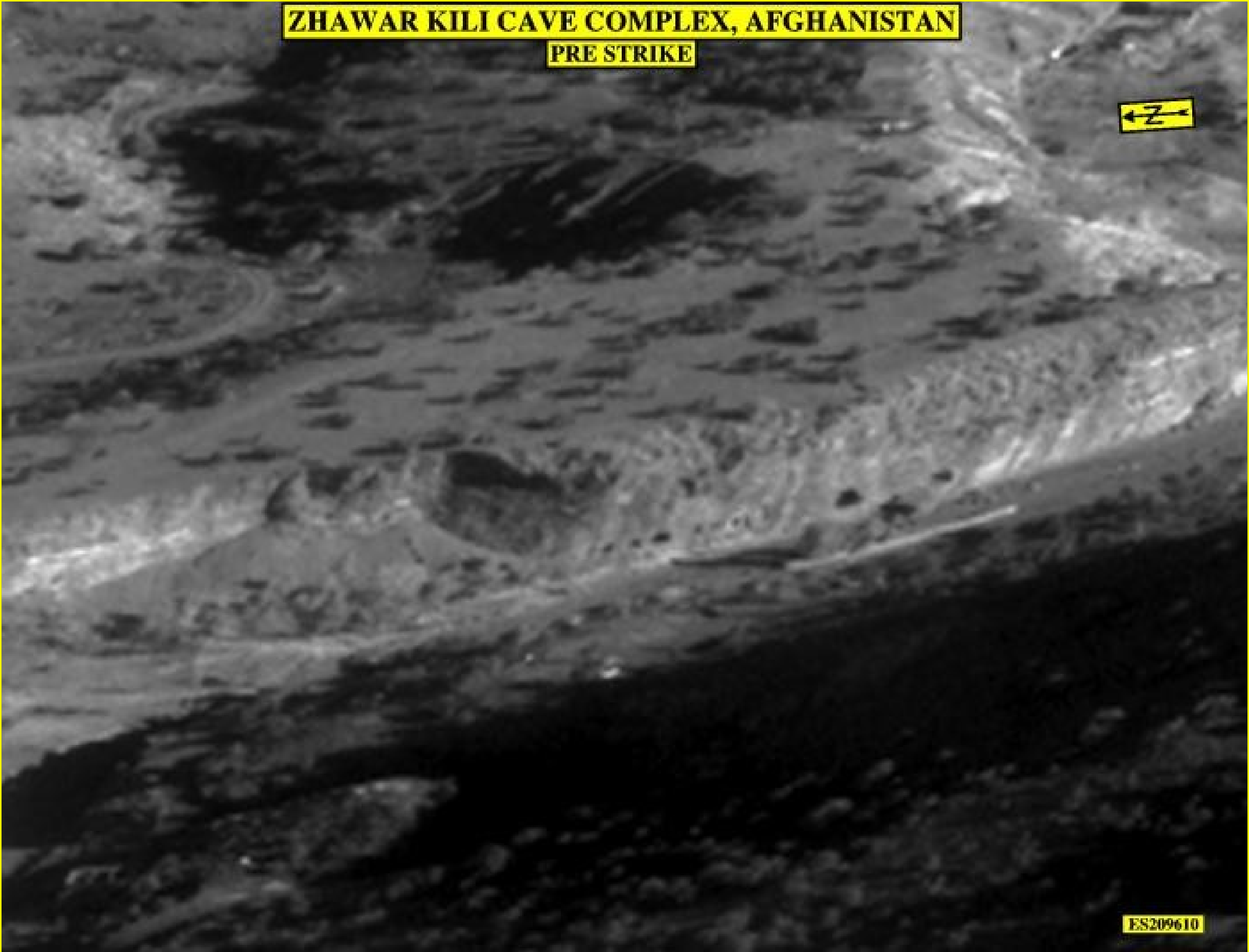
PRE-STRIKE

SHINDAND AIRFIELD IN WESTERN AFGHANISTAN SOUTH OF H
POST-STRIKE



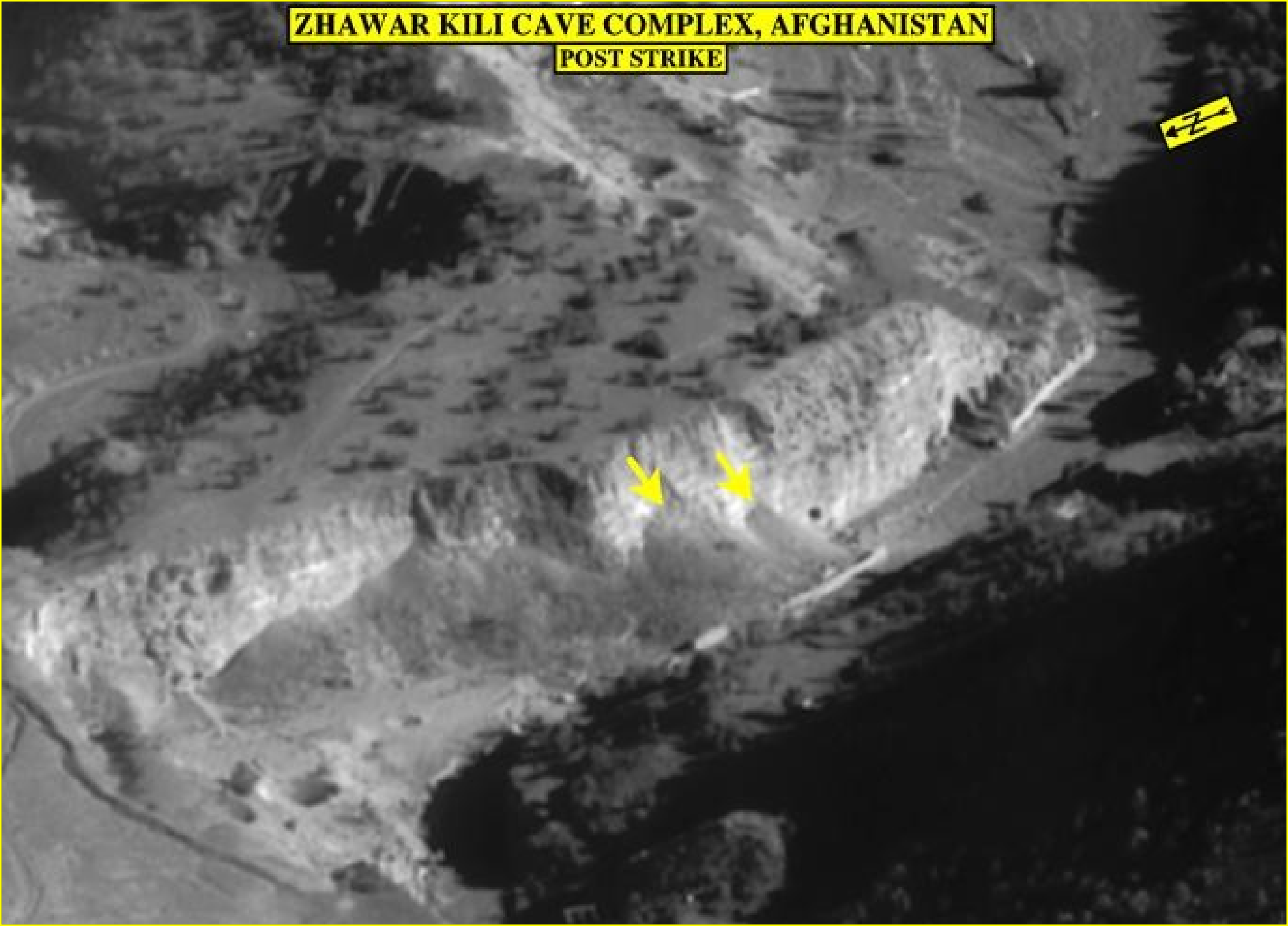
OEF BDA

We can move Mountains…


ZHAWAR KILI CAVE COMPLEX, AFGHANISTAN
PRE STRIKE
N
ES209610

OEF BDA

We can move Mountains…



ZHAWAR KILI CAVE COMPLEX, AFGHANISTAN

POST STRIKE

Operation IRAQI FREEDOM

AIR COMBAT COMMAND

405th AIR EXPEDITIONARY WING

34th BOMB SQUADRON

Operation IRAQI FREEDOM

19 Mar-18 Apr 2003…

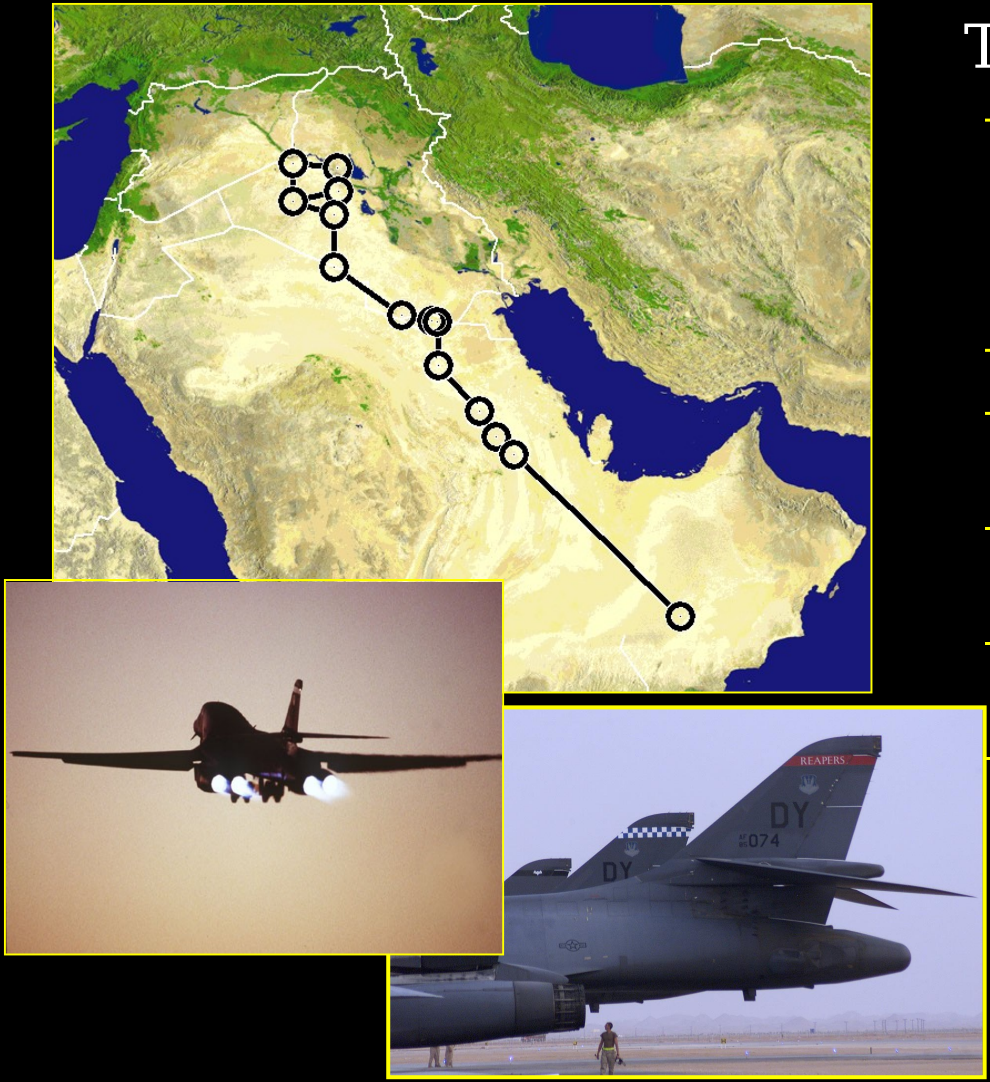
TURKEY
SYRIA
IRAN
IRAQ
JORDAN
AUDI ARABIA
KUWAIT
40°
42°
44°
46°
48°
36°
34°
32°
0
50
100 mi
0
80
160 km
Urfa
Orūmīyeh
Barzān
Dahūk
Zummār
Tall Kayf
Rawāndūz
Sinjār
Mosul
Irbil
Qal'at Dīzah
Al-Hadr
Ash-Sharqāt
Dibs
Kirkūk
As-Sulaymānīyah
Sanandaj
Tūz Khurmātū
Tikrīt
Khānaqīn
Sāmarrā'
Jalūlā'
Bakhtarān
'Ānah
Al Hadīthah
Al-Khālis
Ba'qūbah
Hīt
Ar Ramādī
Baghdad
Al-Mahmūdīya
Ar Rutbah
As-Suwayrah
Al Kūt
Dezfūl
Karbalā'
Al Hillah
Al-Muwaffaqīyah
Al-Kifl
An Najaf
Ad Dīwānīyah
Al 'Amārah
Ar-Rifā'ī
Al-Majarr al-Kabīr
Al-Gharrāf
Ahvāz
As Samāwah
An Nāsirīya
An-Nashwah
As-Salmān
Ash-Shu'aybah
Basra
Ar-Rumaylah
Al Fāw
Kuwait
Hawallī

- Over 40,000 sorties flown
  - Total fighter and bomber sorties = 20,
  - Bombers: 505;   B-1: 197 sorties (0.95

- All but one mission had changes post step

- B-1 dropped 2,282 munitions
  - 2,214 Iraqi targets; 37 Afghani targets; 24 jettisoned
  - 11% of the total number of guided munitions
  - 43% of the GBU-31 JDAMs (from <1% of the missions!)

OIF Mission



- Deployed 10 aircraft to Thumrait AB, Oman
  - Flew an average of 8 sorties per day (surge level ops) for duration of deployment
    - ***First night - 10 sorties***
  - Average sortie duration was 8 hours
  - Covered both Iraq and Afghanistan (OEF) missions
  - Provided 24-hour/day coverage over Iraq
  - Many types of taskings including INT, SAR, XINT, XCAS
  - 414 Total B-1 sorties during OIF
    - Includes flights prior to the start of OIF and after 18 Apr

OIF Mission

Prevent the Iraqi forces from launching any SCUDS into Israel. The President's second highest pri t to elimi e Iraqi

OIF Strike Operations

- **Strategic Attack and Interdiction**
  - Targets were passed from Combined Air Operations Center (CAOC)
    - Passed via secure voice or secure email (Combat Track II)
  - Target Array
    - Leadership Targets in Bagh
    - Airfields
    - Fielded Forces
    - Infrastructure
    - GPS Jamming Towers

OIF SAFIRES on B-1

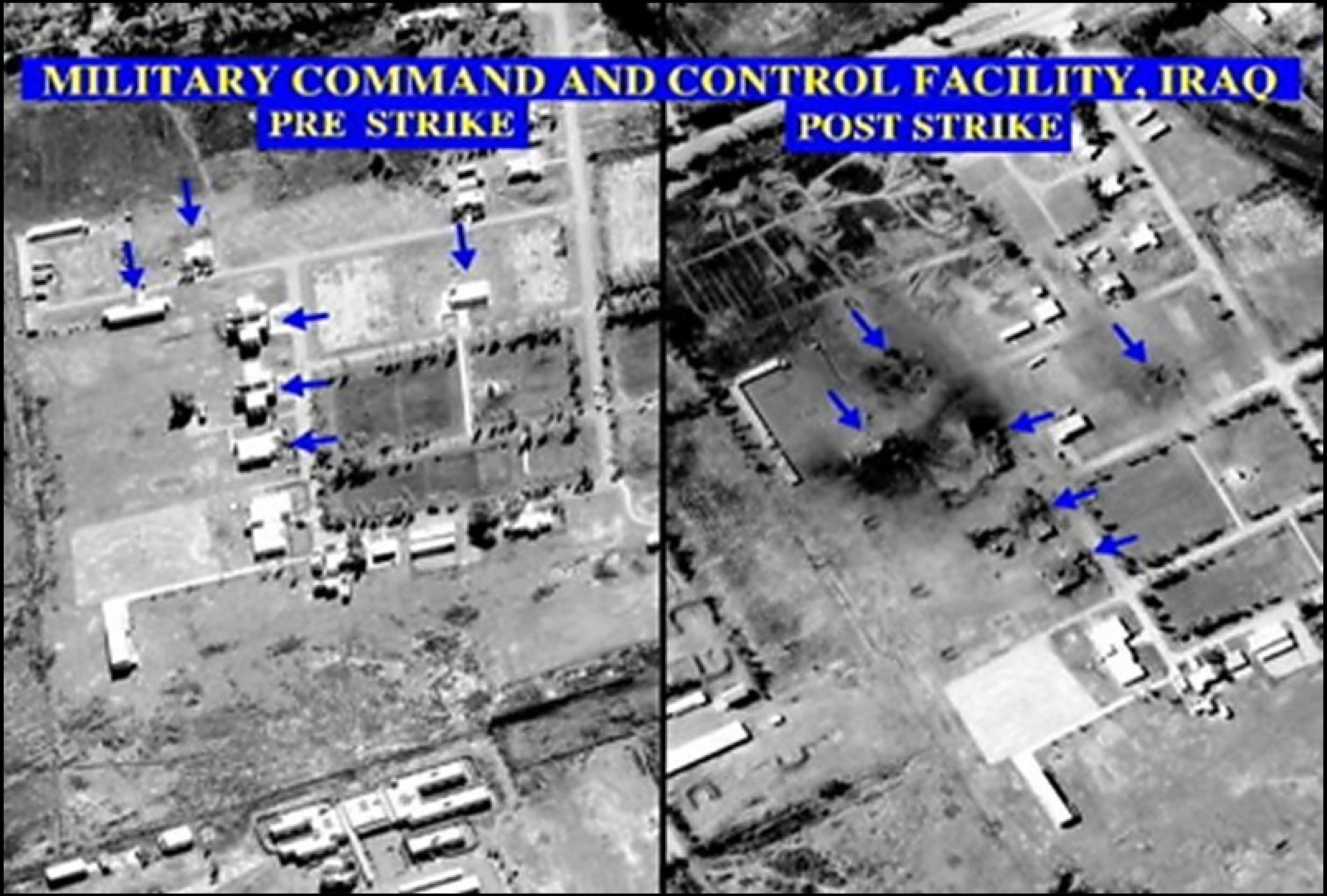
- 71 SAFIRES*
  - 62 Distant
  - 9 Close proximity (< 2 miles)
  - 35 SAMs
  - 36 AAA

- **35 Launches**
  - **17 SAM Launches**
    - **9 SA-2**
    - **1 SA-6**
    - **3 Roland**
    - **4 Unknown SAMs**
  - **10 Science Projects**
    - **8 Ringback,**
    - **2 Hookshot**
  - **8 Unknown Launches**

- * These numbers reflect the CENTAF published and verified Surface to Air FIRES.

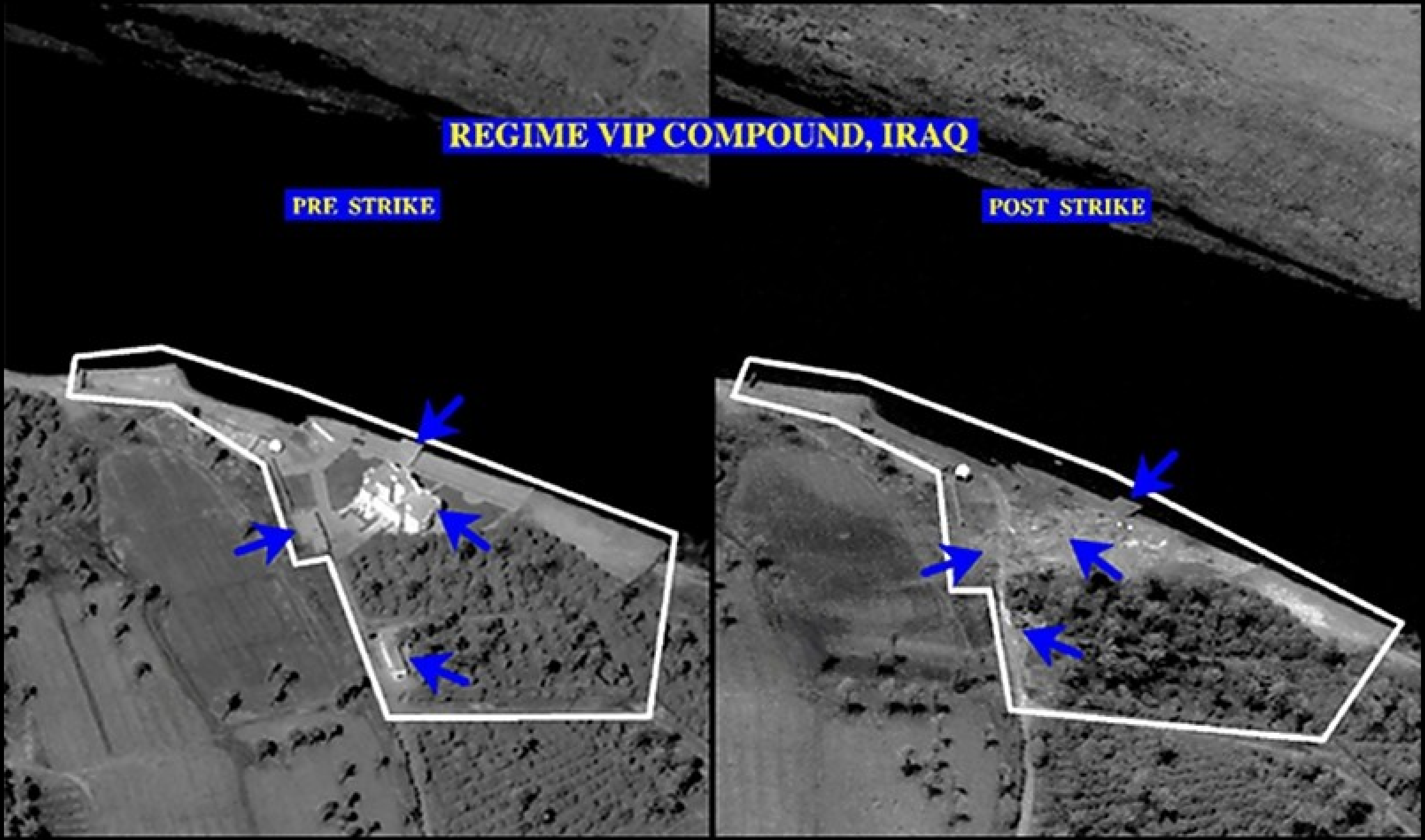
OIF BDA

MORS AB ALTO…


MILITARY COMMAND AND CONTROL FACILITY, IRAQ
PRE STRIKE
POST STRIKE

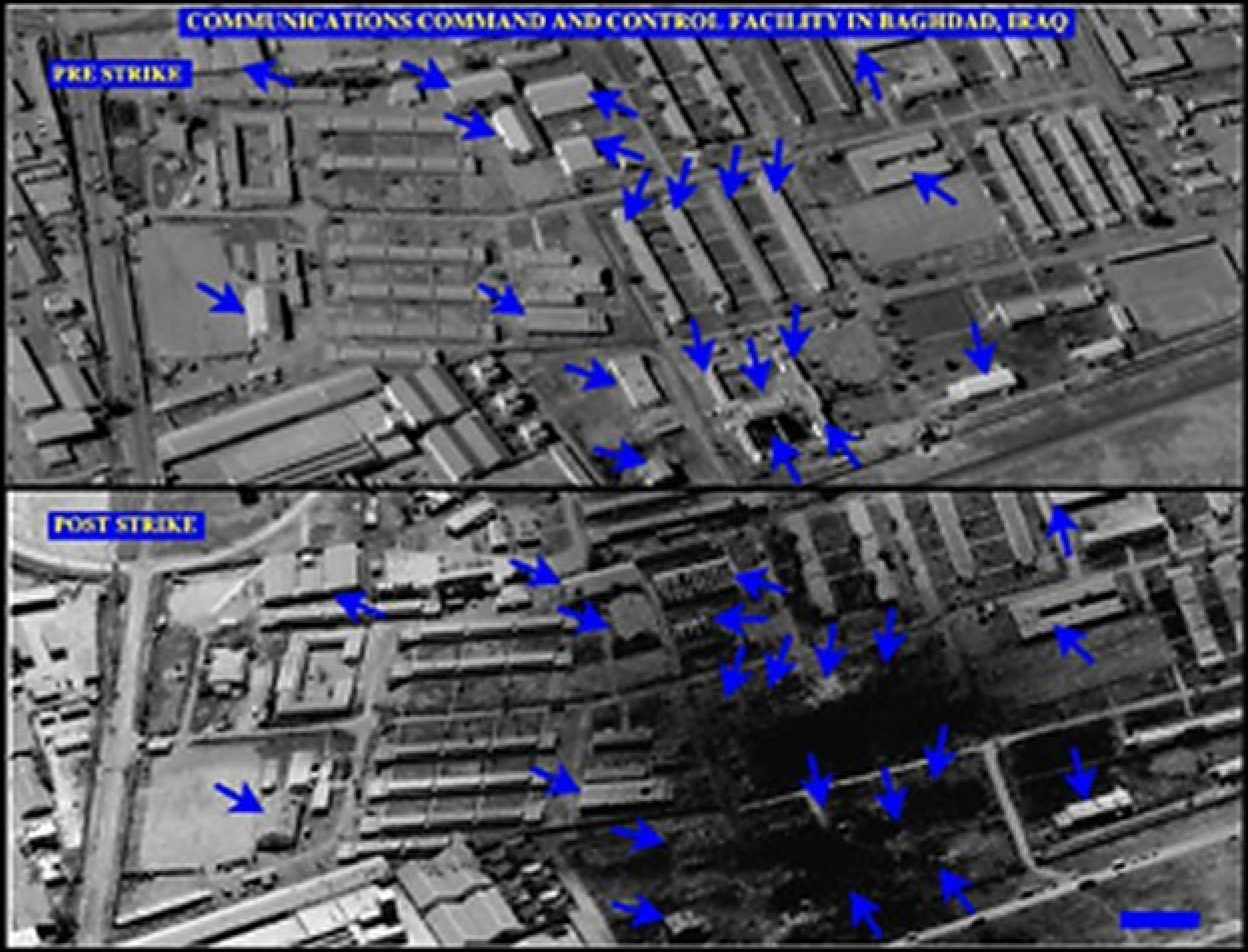
OIF BDA

MORS AB ALTO…


REGIME VIP COMPOUND, IRAQ
PRE STRIKE
POST STRIKE

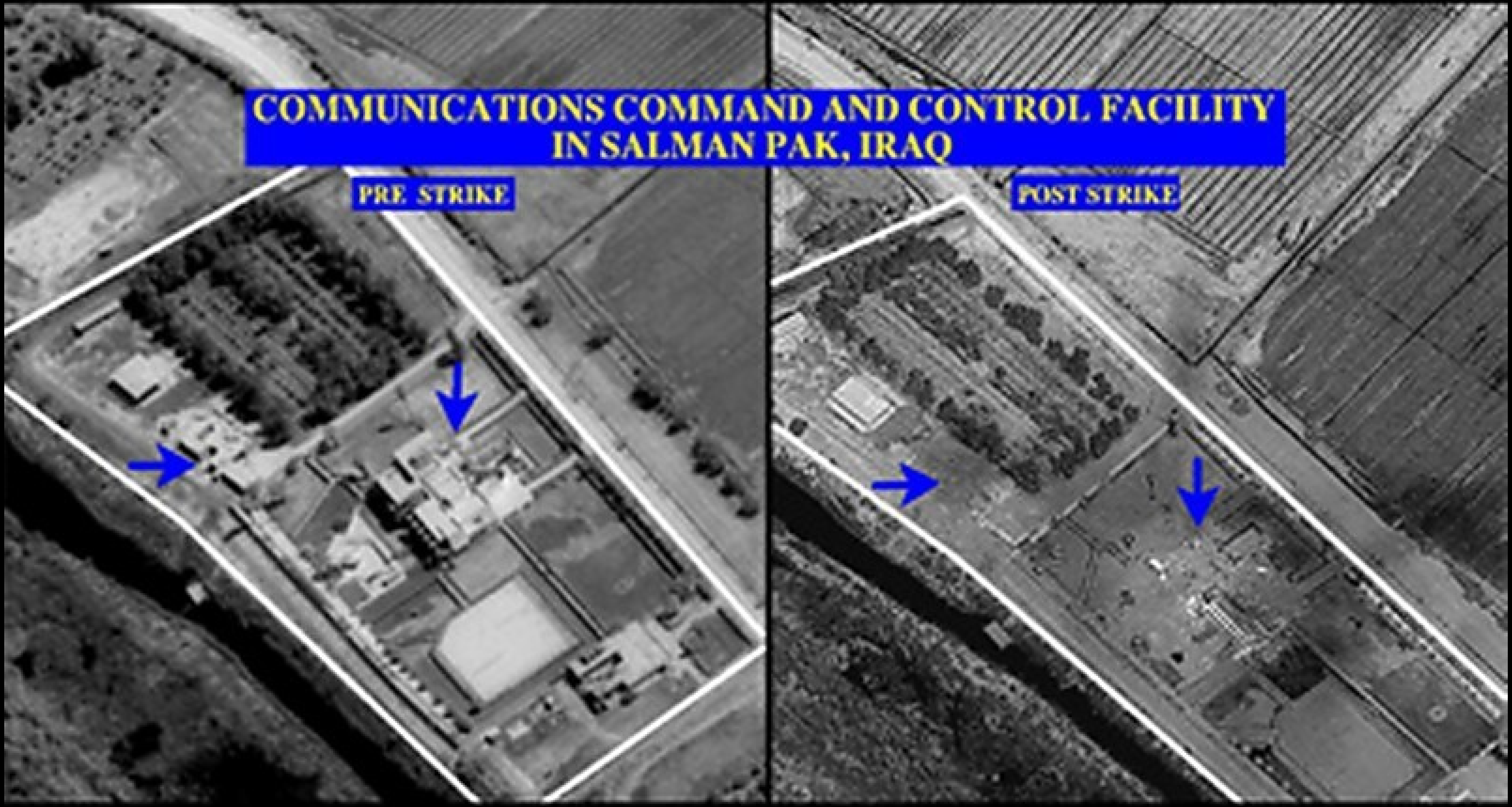
OIF BDA

MORS AB ALTO…


COMMUNICATIONS COMMAND AND CONTROL FACILITY IN BAGHDAD, IRAQ
PRE STRIKE
POST STRIKE

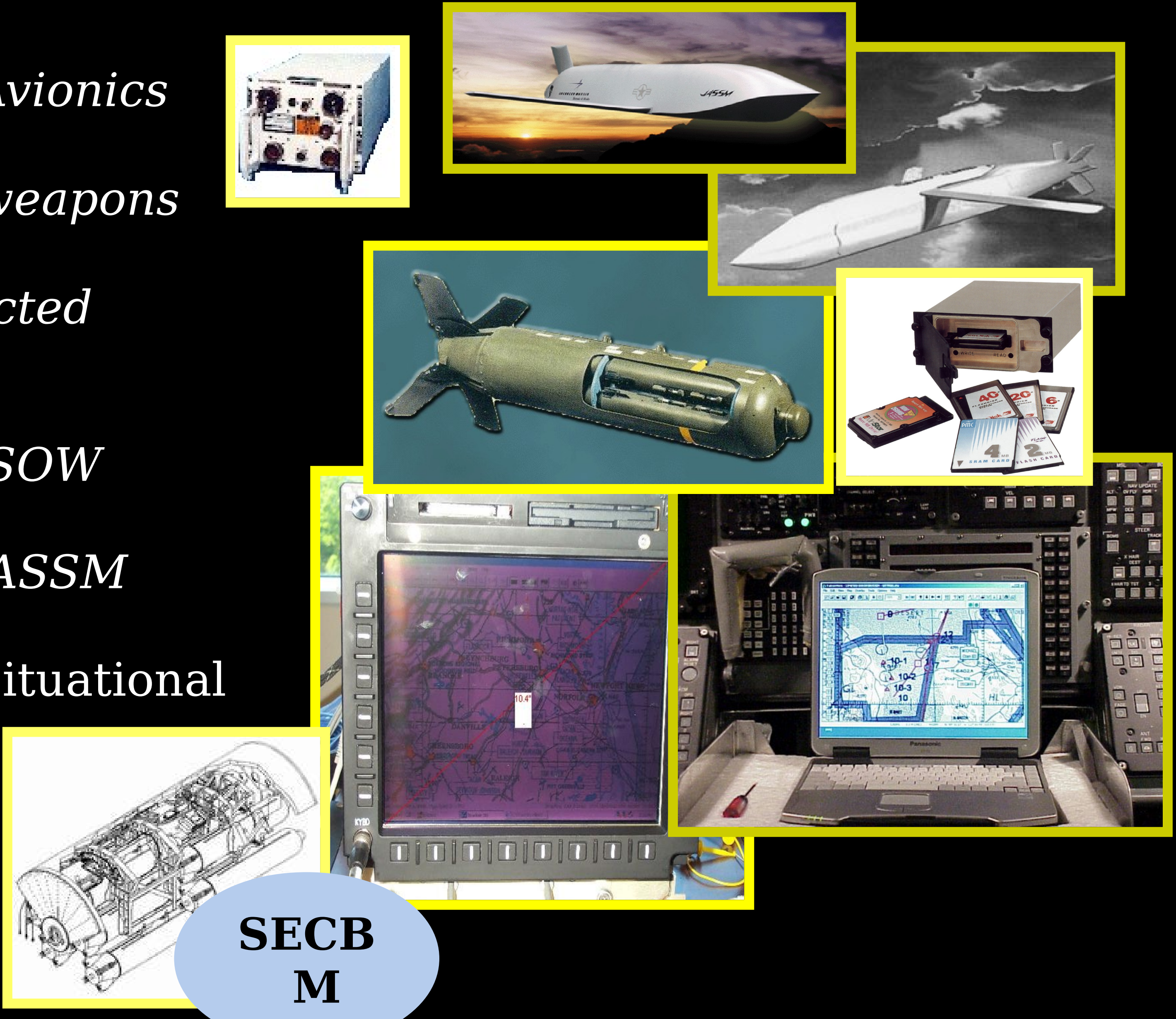
OIF BDA

MORS AB ALTO…


COMMUNICATIONS COMMAND AND CONTROL FACILITY
IN SALMAN PAK, IRAQ
PRE STRIKE
POST STRIKE

B-1 Future: Block E *(it's here!)*

- *Advanced Avionics Computers*
- *Advanced weapons capabilities*
- *Wind corrected munitions*
  - *30 per B-1*
- *AGM-154 JSOW*
  - *12 per B-1*
- *AGM-158 JASSM*
  - *24 per B-1*
- Enhanced situational awareness



SECB M

Main Block E Upgrades

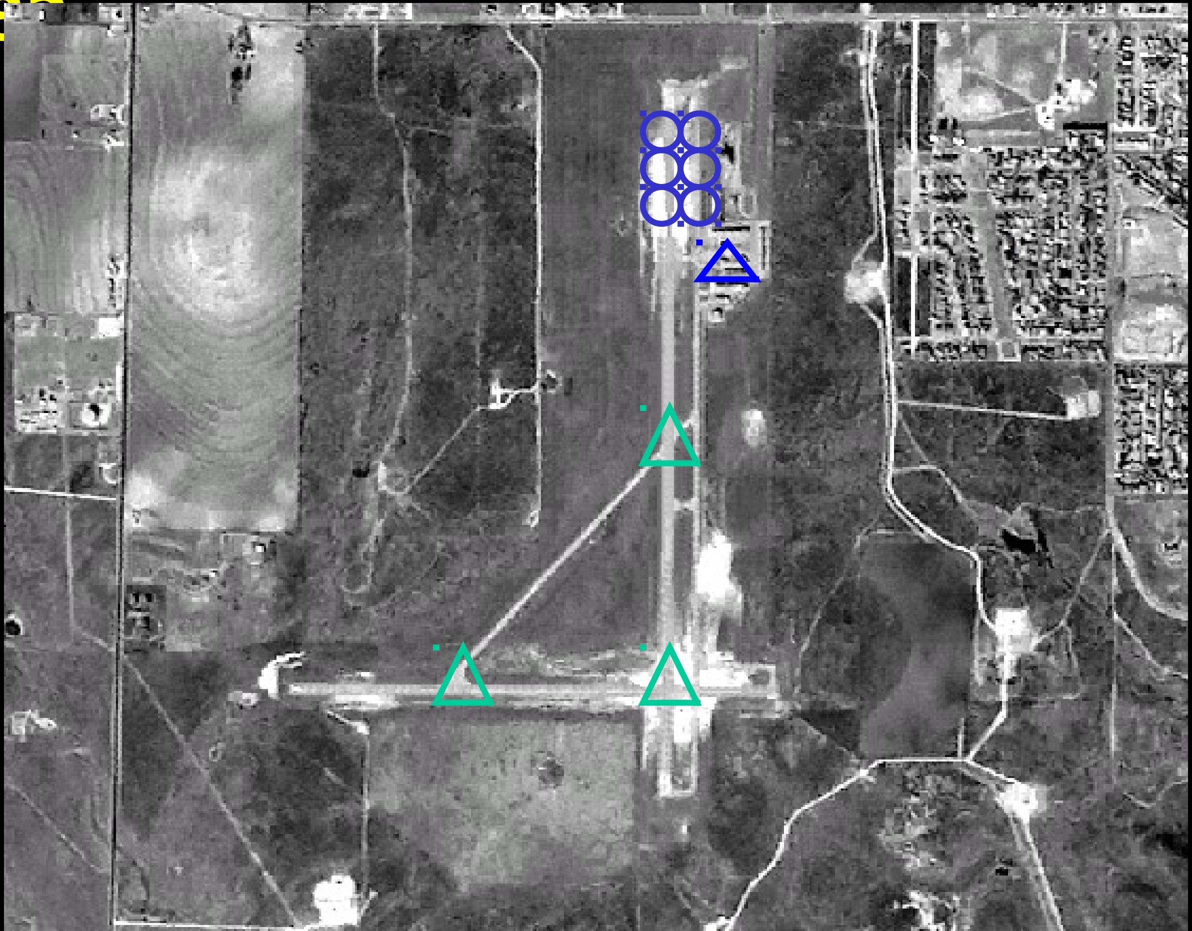
- Cockpit Operations Faster / Streamlined
- Interleaved Search and Track (ILST) Radar Mode
- Multi-bay / Weapon Release Capability
  - GBU-31, WCMD, Mk82, Mk84, CBUs and Mines

2 JDAM 2 WCMD 2 Mk82

(AFT BAY) (MID BAY) (FWD BAY)

The Block E B-1 in Global Strike

- **Single Pass Multi-Weapon Attacks**
  - **Simultaneously Attack With JDAM / WCMD / Mk82**



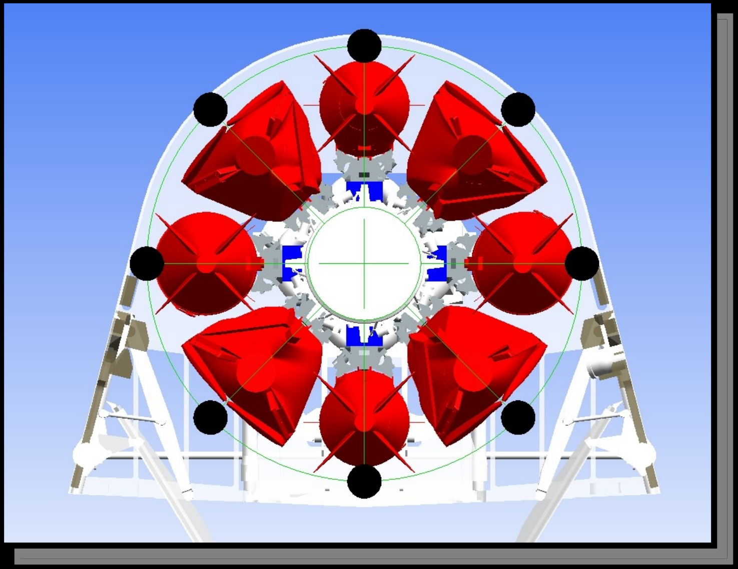
BLOCK “E” ADDITIONS

MIXED WEAPON LOADS…

- Result of ACC request to assess addition of Mixed Weapon Loads on a rotary launcher within a bay to the Block E JJI release versus waiting 2 - 4 years for a future sustainment upgrade

- Maximizes weapon load, JD
JASSM/JSOW combinations wi
specific software

- Effort added to contract Ju



Substantial Avionics Upgrade

Block D

- Four 70s Era Avionics Computers
- 4 Software Loads Per Mission
- 5 DTUCs (Tape Drives) @ $10,000 Each
- Proprietary Code
- “Optimized” Launch Acceptability Regions (LARs) for Guided Weapons

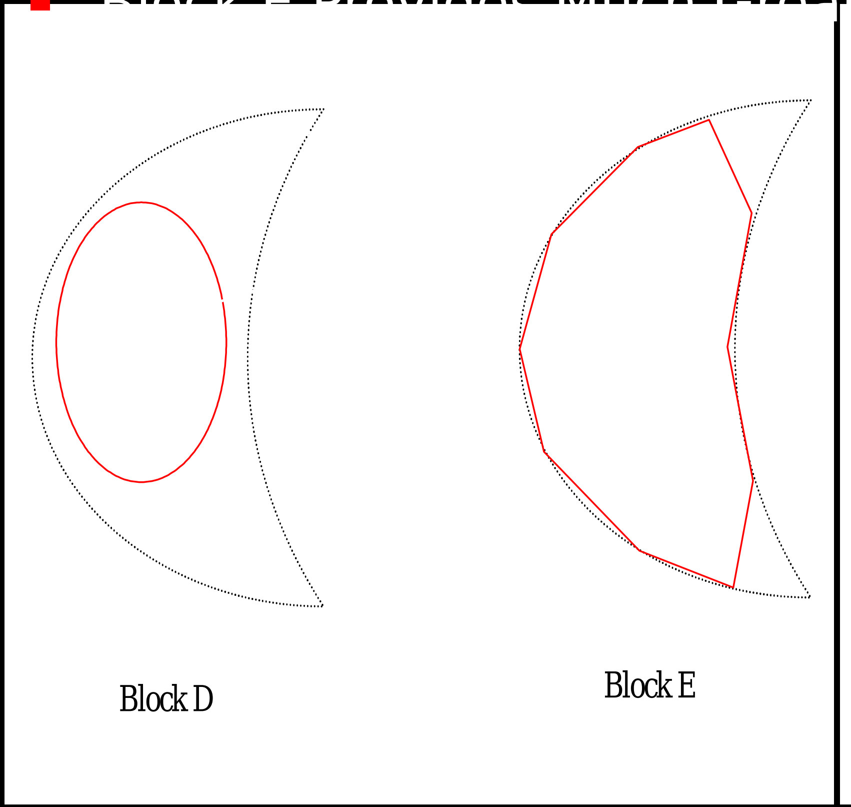
Block E

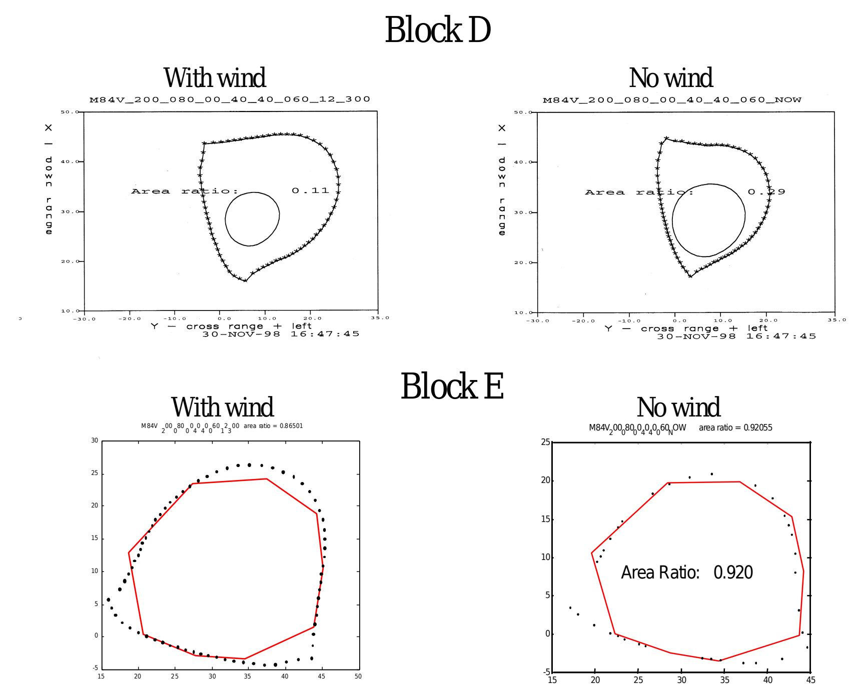
- Two Pentium Computers
- 1 Software Load Per Mission
- 2 PC Cards @ $200 Each
- DoD Standard Code (ADA)
- Expanded Launch Acceptability Regions (LARs)

Improved Reliability & Sustainability

Improved LARs

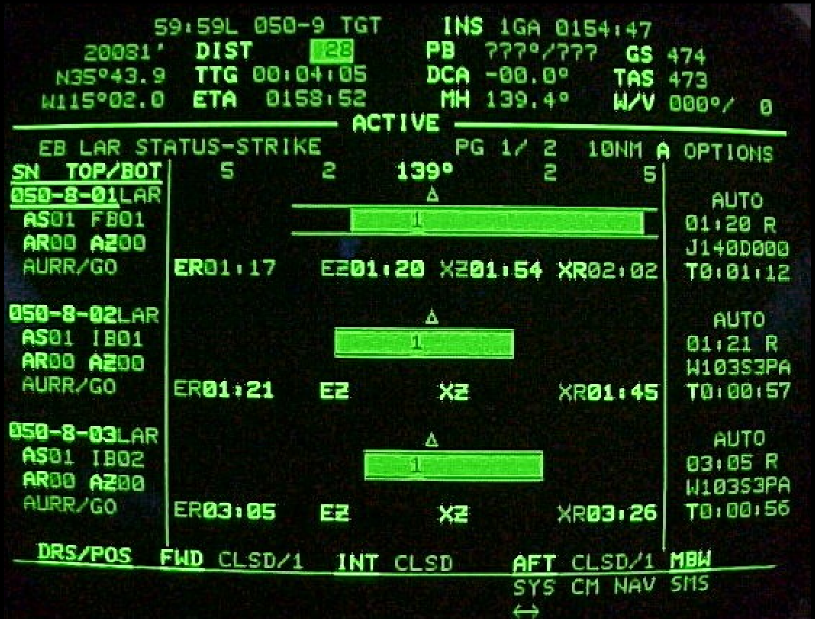
- Block D Used Lookup Tables (Tab Data) and Linear Interpolation
- Block E Employs Real-Time Release Conditions and Target Parameters - Far Better in Changing Wind Conditions
- Block E Provides Much Greater Flexibility in Target Area





Avionics Improvements

- Increased Situational Awareness
  - Weapon and Navigation Data Improved
  - Digital Bullseye
  - “LAR Bars” ease Guided Munition Prosecution
- “Copy / Paste” DMPIs
- Wind Corrected Munitions Dispenser (WCMD)

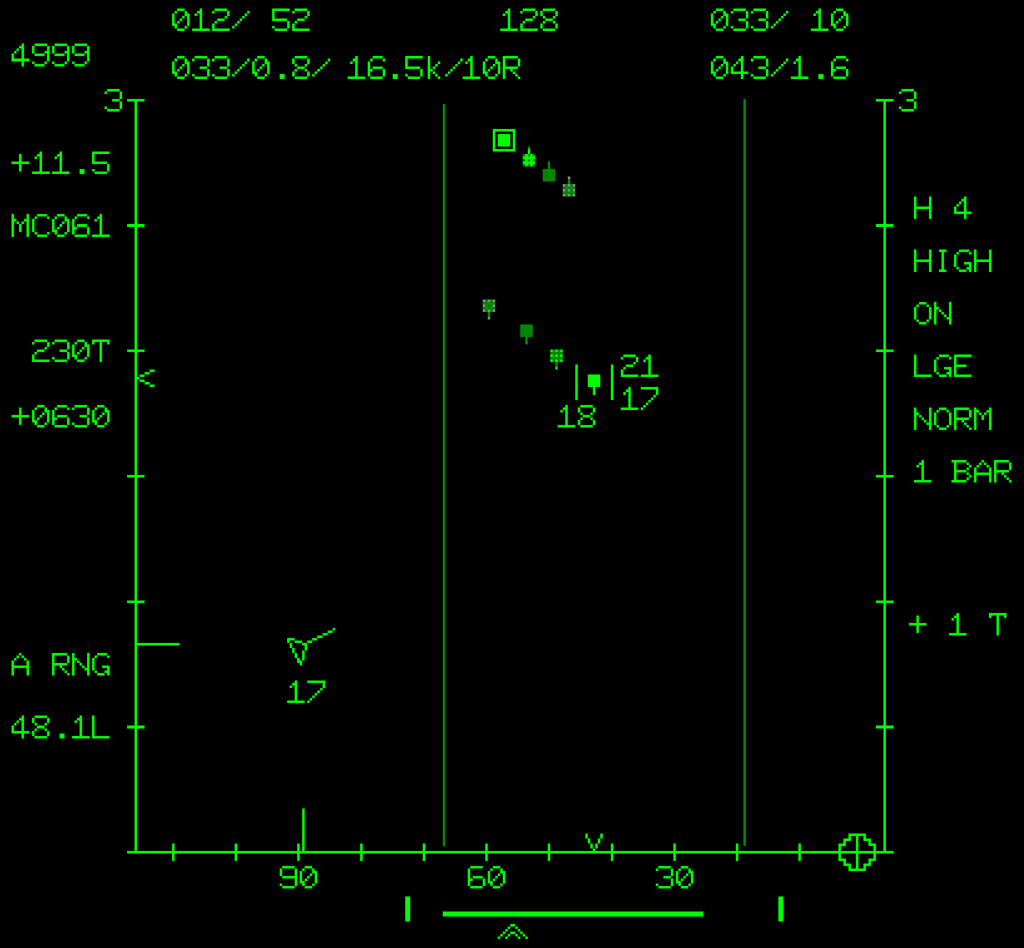


```
        59:59L 050-9 TGT      INS 1GA 0154:47
   20081'  DIST       28      PB  ???°/???  GS 474
  N35°43.9 TTG 00:04:05       DCA -00.0°    TAS 473
 W115°02.0 ETA  0158:52        MH 139.4°    W/V 000°/  0
____________________________ ACTIVE ____________________________
 EB LAR STATUS-STRIKE               PG 1/ 2  10NM A OPTIONS
SN  TOP/BOT|   5       2     139°        2       5|
050-8-01LAR|                  Δ                   |   AUTO
 AS01 FB01 |              [     1               ] |  01:20 R
 AR00 AZ00 |                                      |  J140D000
 AURR/GO   |ER01:17  EZ01:20 XZ01:54 XR02:02      |  T0:01:12
           |                                      |
050-8-02LAR|                  Δ                   |   AUTO
 AS01 IB01 |             [    1      ]            |  01:21 R
 AR00 AZ00 |                                      |  W103S3PA
 AURR/GO   |ER01:21   EZ       XZ       XR01:45   |  T0:00:57
           |                                      |
050-8-03LAR|                  Δ                   |   AUTO
 AS01 IB02 |               [    1      ]          |  03:05 R
 AR00 AZ00 |                                      |  W103S3PA
 AURR/GO   |ER03:05   EZ       XZ       XR03:26   |  T0:00:56
 DRS/POS  FWD CLSD/1  INT CLSD     AFT CLSD/1 MBW
                                   SYS CM NAV SMS
                                   ↔
```

Avionics Improvements

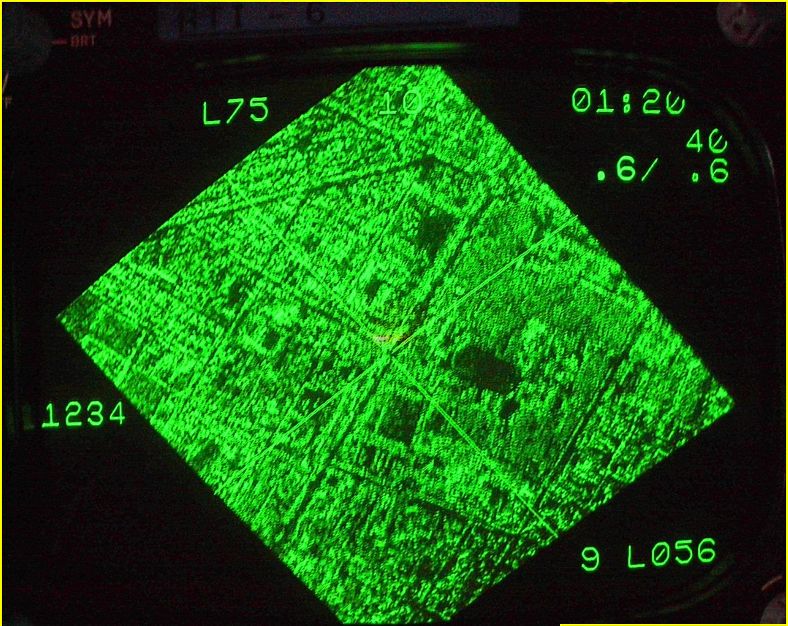
Yes Air-to-Air Rdr…

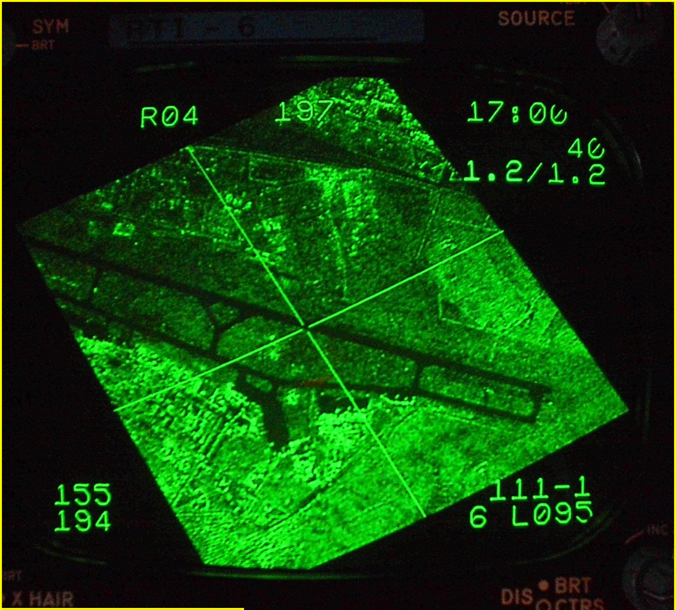
- **ILST - Essentially the F-16 “SAM” Mode**
- **Search up to 64 Contacts, Track One**
- **Tracked Contact Also Updates Threat Situation Display**


012/ 52
128
033/ 10
4999
033/0.8/ 16.5k/10R
043/1.6
3
3
+11.5
MC061
H 4
HIGH
ON
230T
LGE
+0630
NORM
1 BAR
21
17
18
+ 1 T
A RNG
17
48.1L
90
60
30

HI-RES UPGRADE

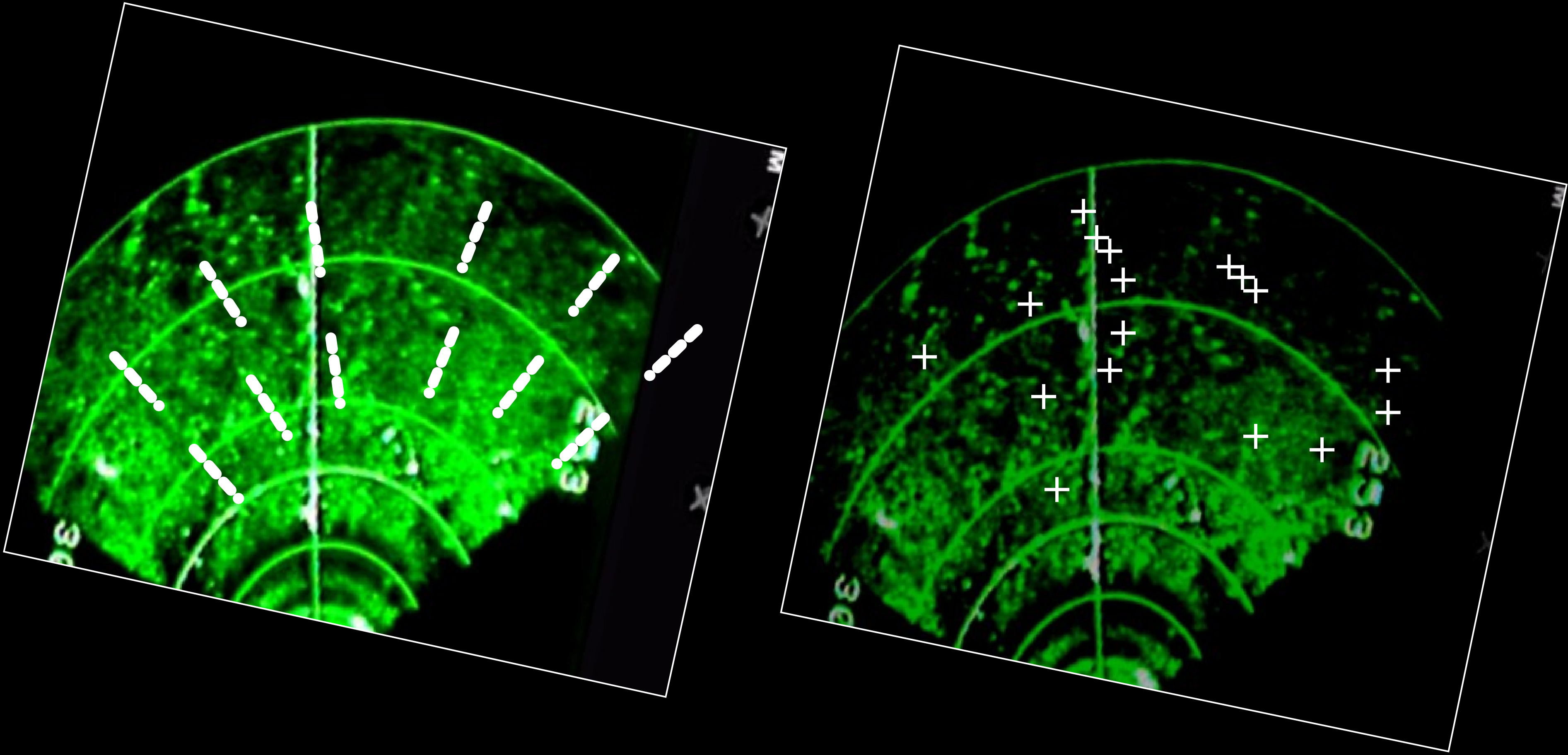
Precision Weapons need precision aiming


SYM
BRT
L75
10
01:20
40
.6/ .6
1234
9 L056
BRT
X HAIR
ORNG MK


SYM
BRT
SOURCE
R04
197
17:00
40
1.2/1.2
155
194
111-1
6 L095
X HAIR
DIS
BRT
CTRS

Proposed
1’ to .5’ Resolution S

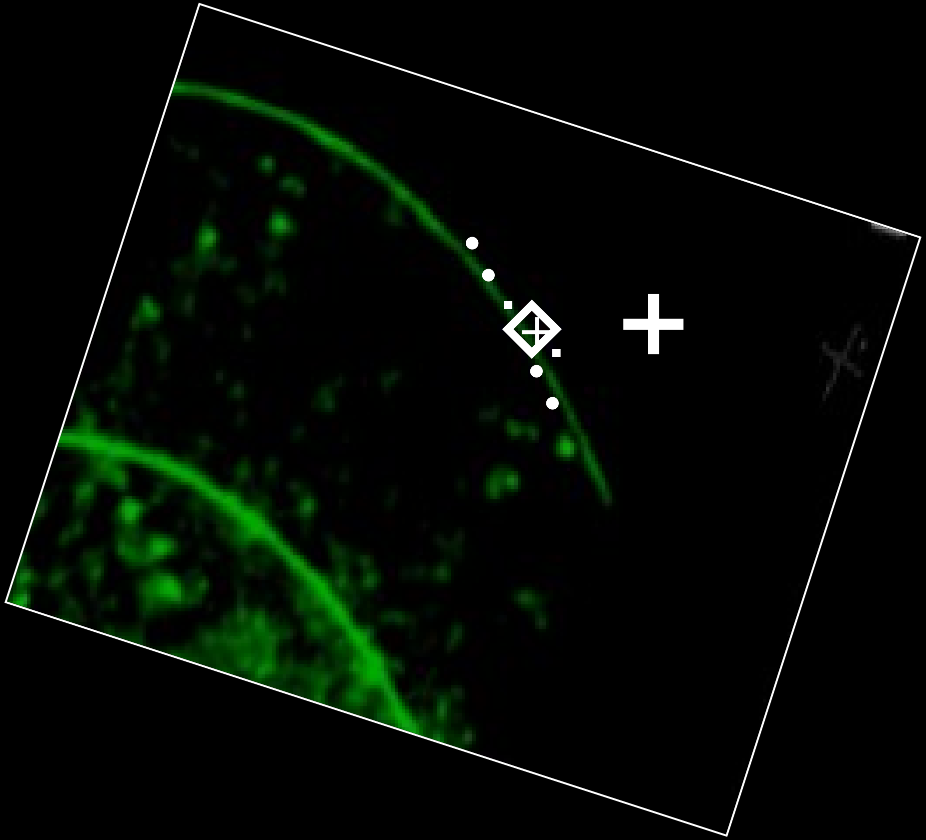
GMTI Operation



BUILDING

GMTI Operation

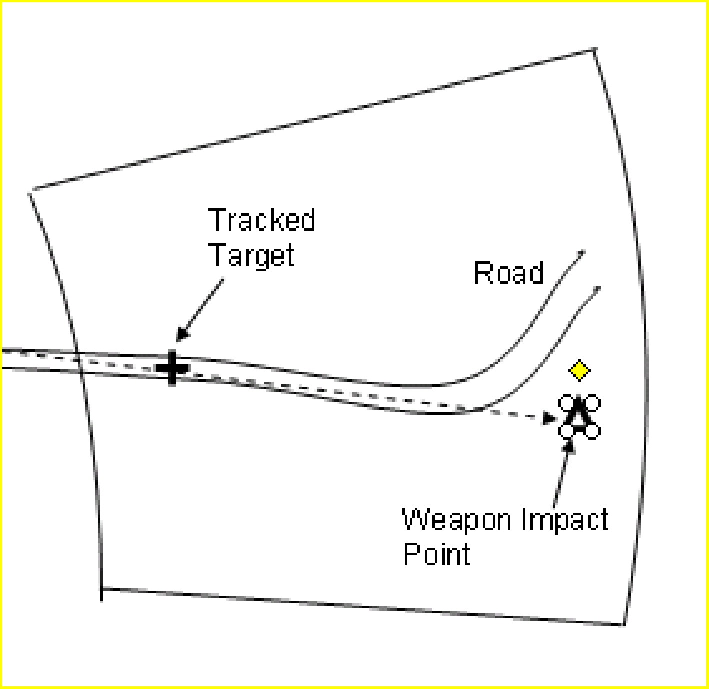
- Radar tracks moving target and computes weapon impact point
- Large plus displayed around target
- Qual value 0 – 9
    - 0 < 100’
    - 9 > 900’

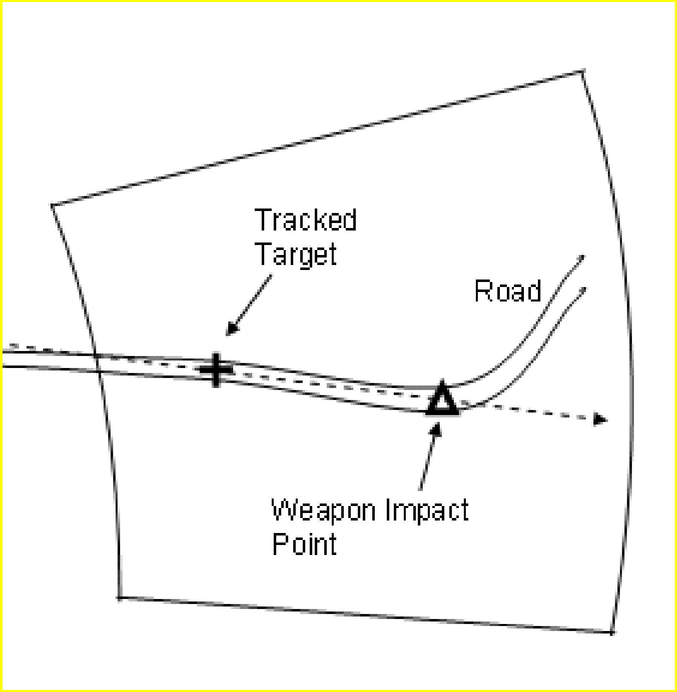


DIAMOND / CAPTURED

The B-1 Block E in Global Strike

- **Advanced Radar Targeting**
  - **Automatically Target Stationary or Moving Targets With GBU-31 or WCMD**
  - **Weapon Stick, Impact Point Displayed on Radar**
    - **WSO can direct WCMD lay-down axis**

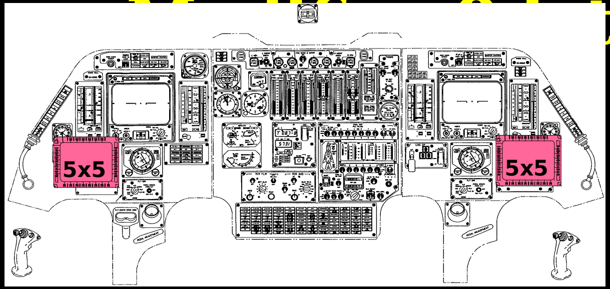

Tracked Target
Road
Weapon Impact Point

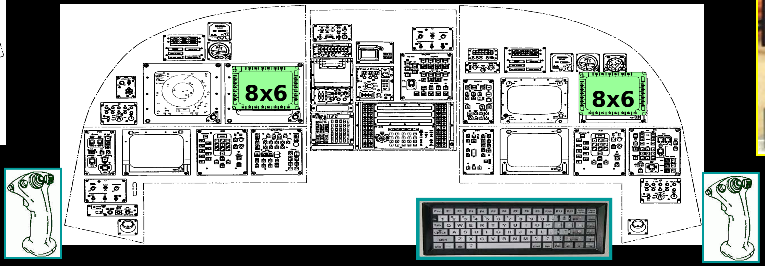

Tracked Target
Road
Weapon Impact Point

Interim Datalink (IDL)

- **Adds Link 16 (Line of Sight) and Combat Track II/Airborne Quad Z (Beyond Line of Sight) datalinks**
  - Color displays at each crew station
  - Falcon View
- **Permanent modification – not integrated with A/C systems except for power, and A/C position data (1553 data b**

ts

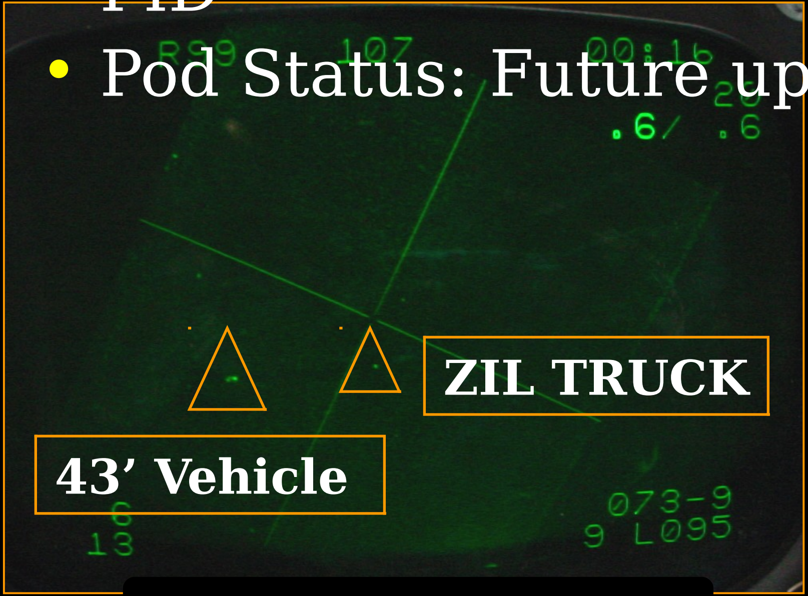




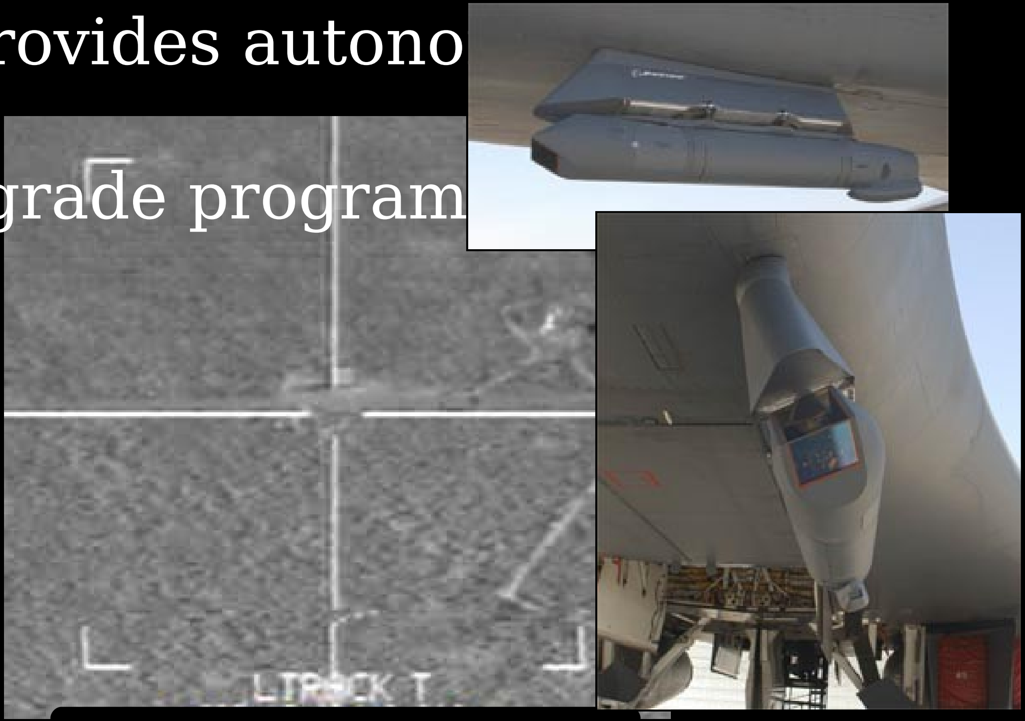
Aft Display

Targeting Pod (SNIPER)

- B-1 Time Sensitive Targeting (TST) experience during OEF / OIF:
  - 95% of B-1 OIF missions re-tasked in-flight
  - Off-board sources required for target Positive Identification (PID)
- EO/IR targeting pod provides autono PID
- Pod Status: Future upgrade program


R89
107
00:16
20
.6/ .6
ZIL TRUCK
43’ Vehicle
073-9
9 L095
6
13

Current capability (Hi-res radar)



Desired capability (EO/IR Pod)

Block E Weapons

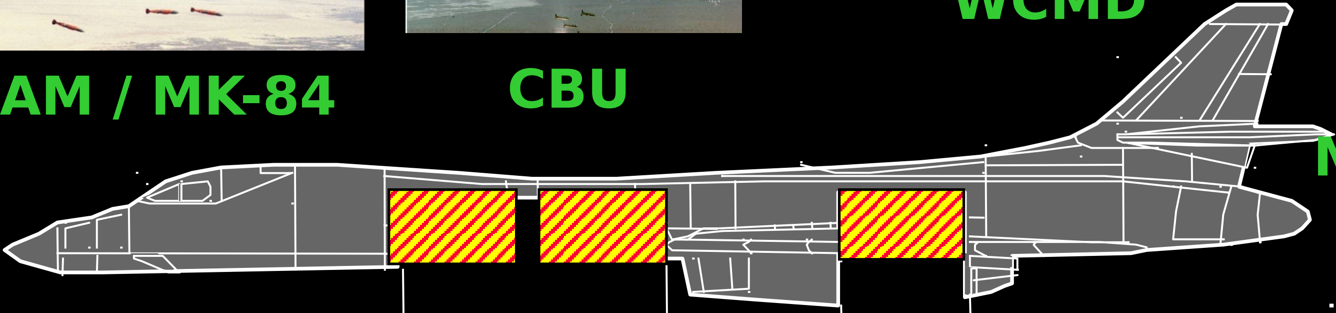
It's a whole new ballgame…

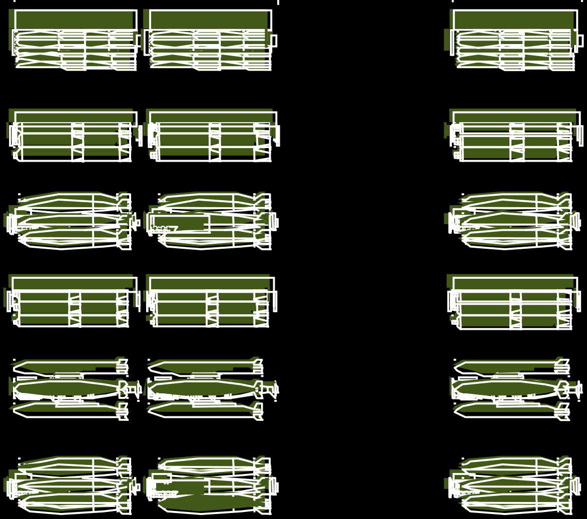
JDAM / MK-84

CBU

WCMD

MK-82 / MK-62





84 x MK-82 / MK-62

30 x CBU-87 / 89 / 97

24 x JDAM / MK-84

30 x WCMD

12 x JSOW

24 x JASSM

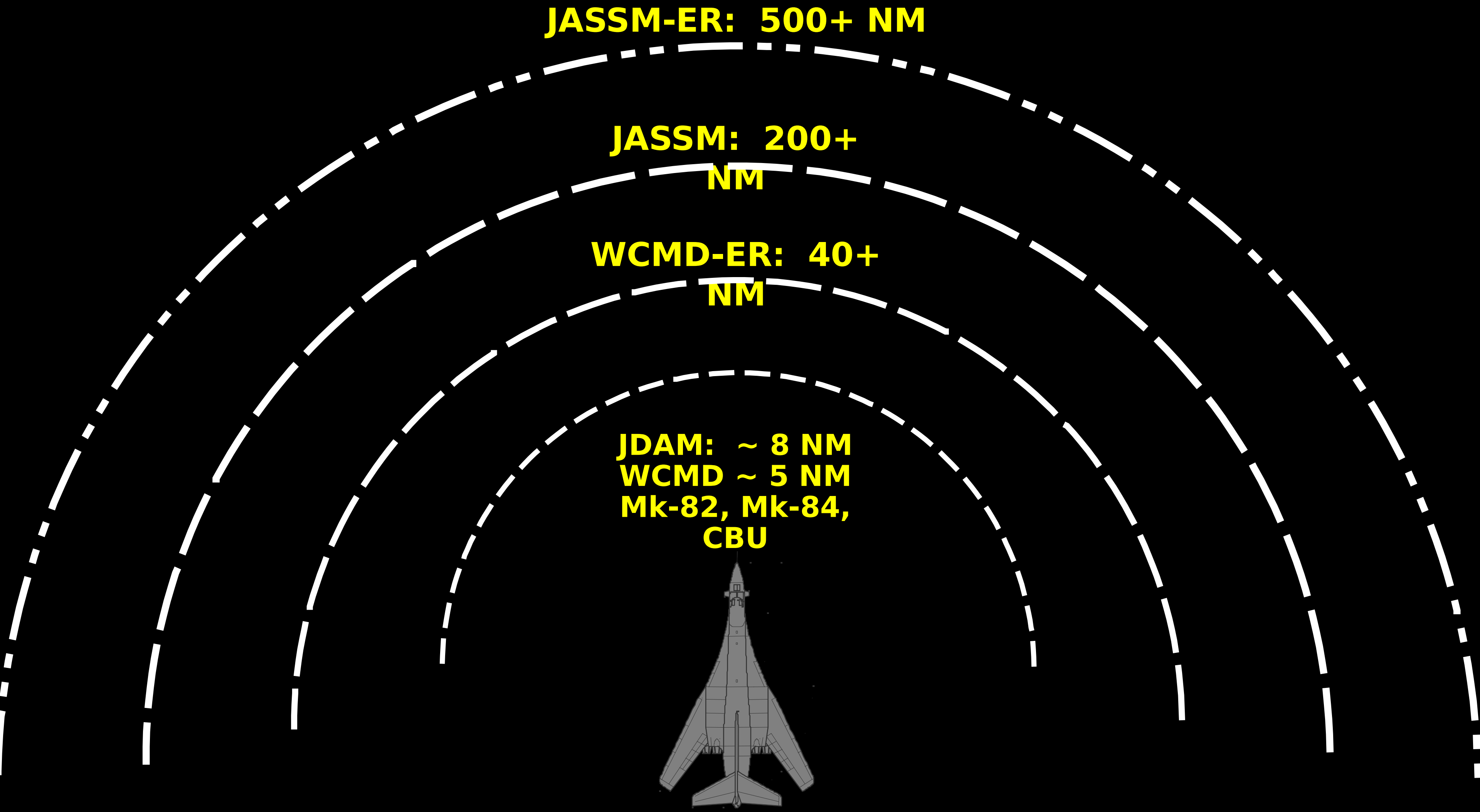
JASSM
MCDONNELL DOUGLAS

JASSM

JSOW

JASSM Capable Now / Crews Fully Trained

A Range of Options



JASSM-ER: 500+ NM

JASSM: 200+ NM

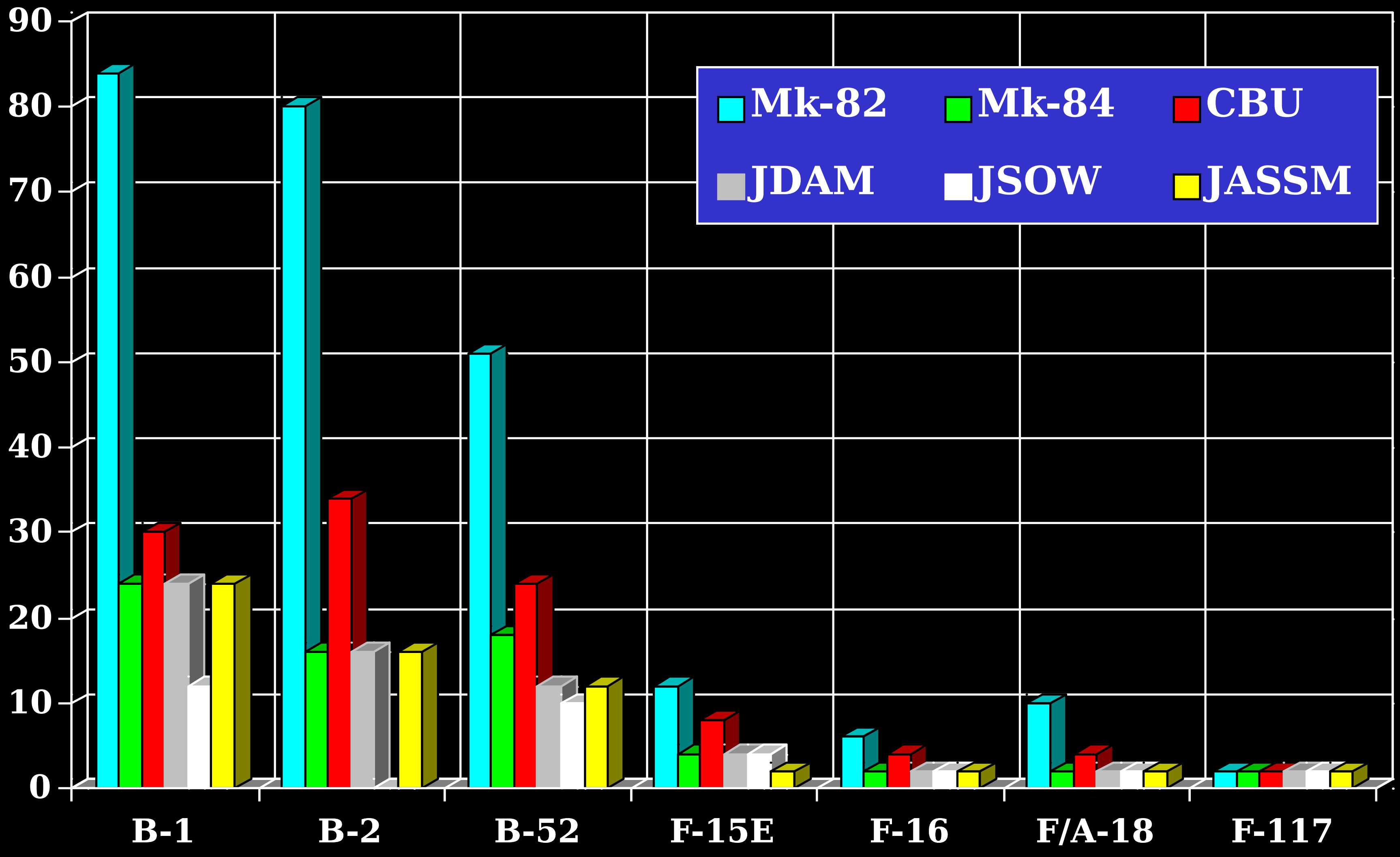
WCMD-ER: 40+ NM

JDAM: ~ 8 NM
WCMD ~ 5 NM
Mk-82, Mk-84, CBU

Single Sortie Global Strike

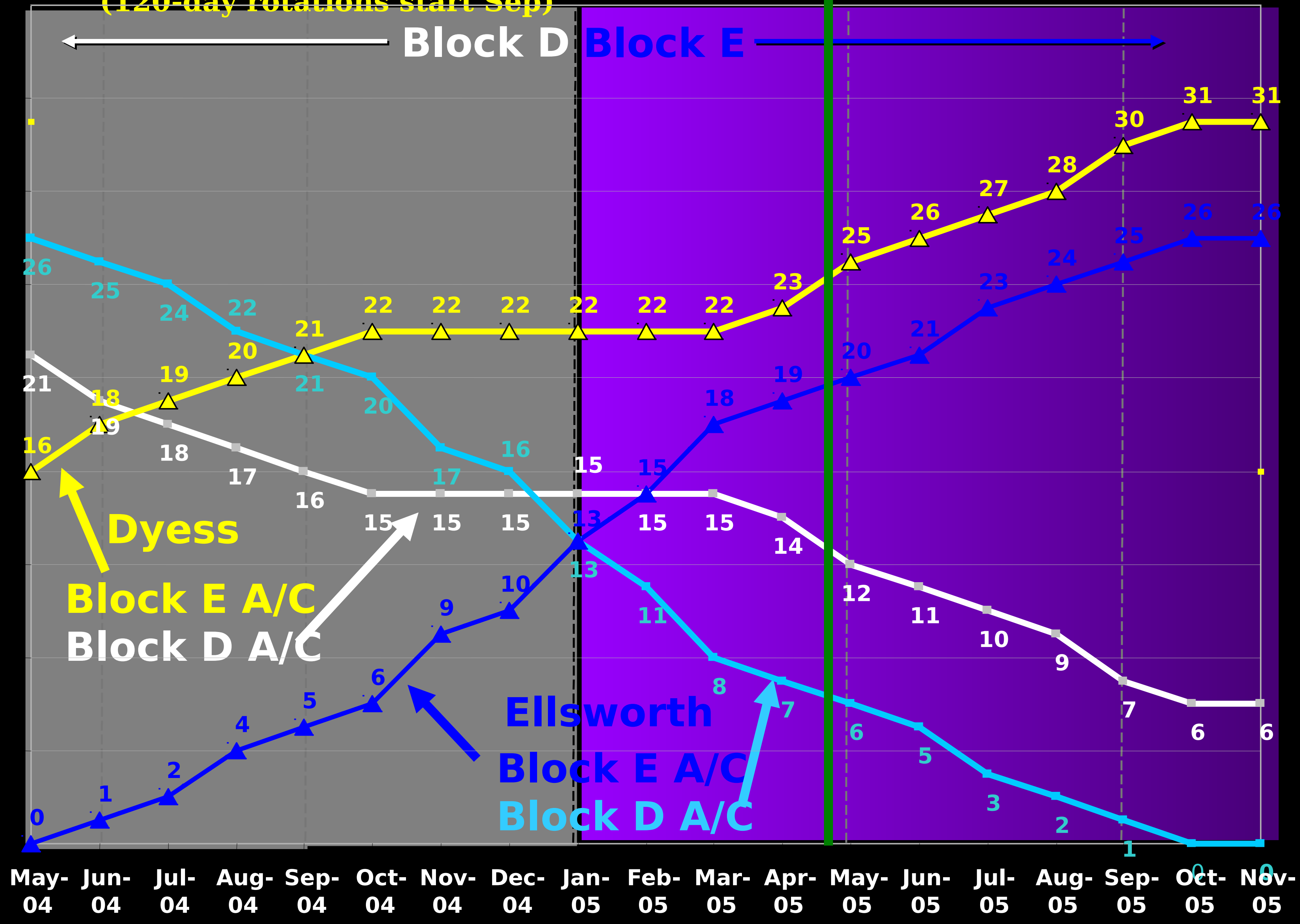
Comparisons

To the rest of the Fleet….



Block E Aircraft Beddown Plan

(120-day rotations start Sep)



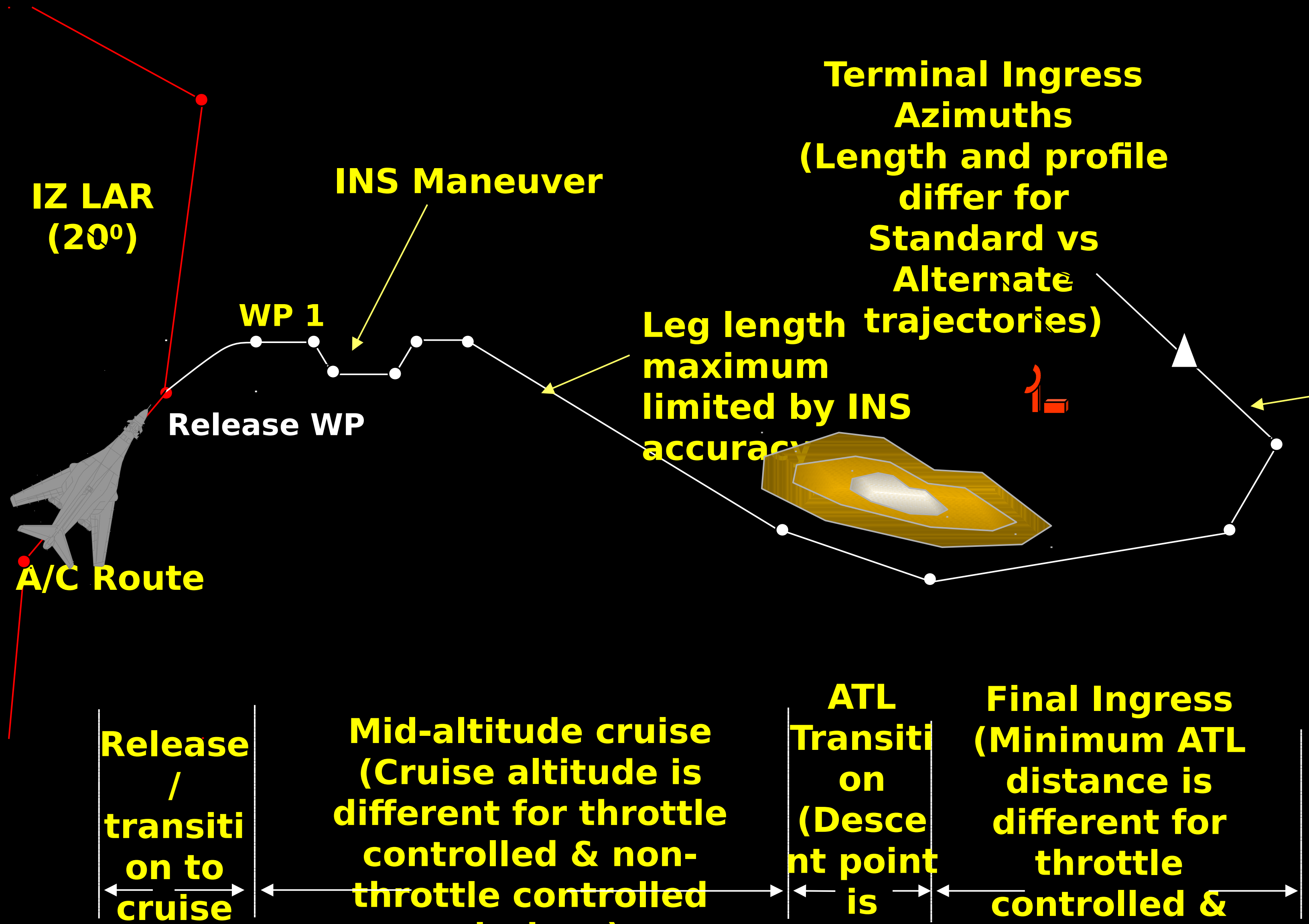
JOINT AIR-TO-SURFACE STANDOFF MISSILE

(JASSM)

- 24 weapons per B-1
- Use against high-value, heavily defended targets
- Low observable
- Launching aircraft remains outside enemy defenses
- B-1 only MDS to release with no problems

Precision Stand-Off Capability

JASSM Flight Profile – Top View



IZ LAR (20^0)

INS Maneuver

Terminal Ingress Azimuths (Length and profile differ for Standard vs Alternate trajectories)

WP 1

Leg length maximum limited by INS accuracy

May be only acceptable ingress

Release WP

A/C Route

Release / transition to cruise

Mid-altitude cruise (Cruise altitude is different for throttle controlled & non-throttle controlled missions)

ATL Transition (Descent point is variable)

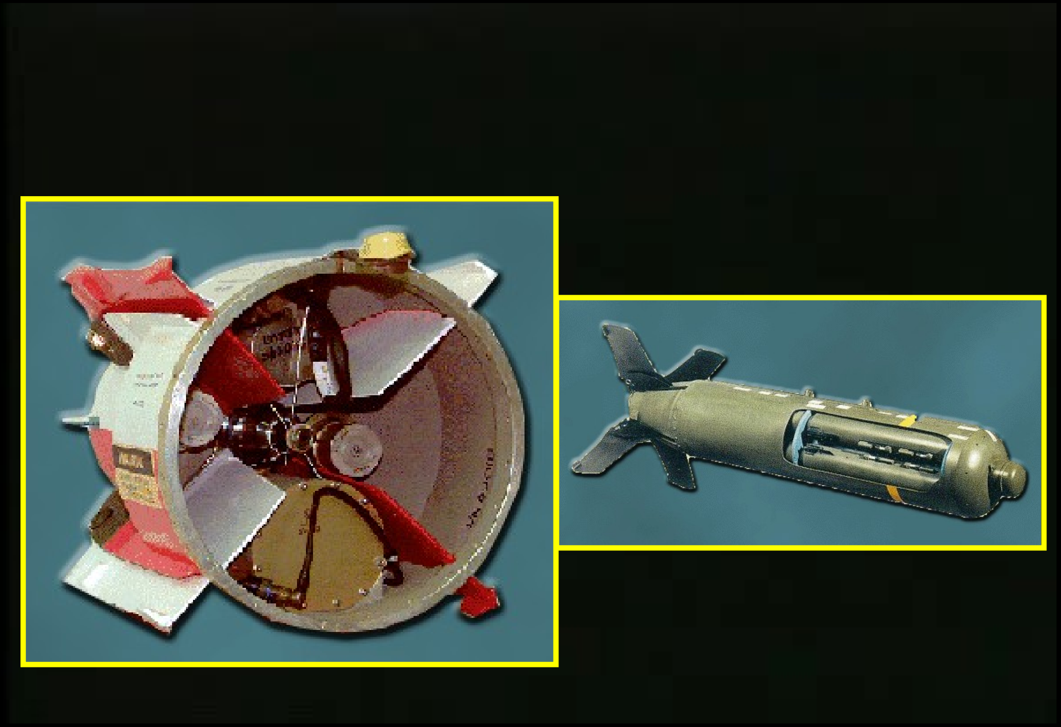
Final Ingress (Minimum ATL distance is different for throttle controlled & non-throttle controlled

Sensor Fuzed Weapon
(SFW)

- Wide-Area Cluster Munition
- 40 Projectiles per Bomb

24-Hour, All-Weather, Operational Capability

WIND-CORRECTED MUNITIONS DISPENSER
(WCMD)



- Inertial guidance kit for existing cluster bombs
- All-weather capability
- Multiple targets in a single pass

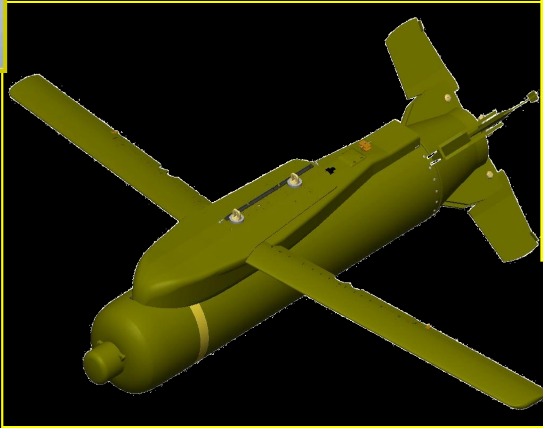
Accuracy at High Altitudes

JOINT STANDOFF WEAPON
(JSOW)

- Program terminated in favor of WCMD-ER
- Currently have some 400 weapons
- B-1 will remain capable throughout 2005

Small Diameter Bomb, WCMD-ER, 500 LB JDAM

16 500 lbs JDAM



30 WCMD-ER

32 SDB per bay

Design Considerations

If you are asking…

- Improved Data Link Capability
  - Post release data link
- Maximize in-flight data/mission modification capability
- Positive Identification Capability
- Long duration issues
  - Power on challenges
  - Captive Carry Issues (training & combat)
  - Sim vs. Real software—minimize differences
- Minimize parameter limitations (speed & Alt)
- Bomber delivery issues
  - Weapon battery duration, CRL/CBM fit, etc.

OK…That’s it

So What’s the Bottom Line?

- Block E transforms the B-1 into the Precision Supersonic
  - *Explosive leap in capability*
- Proven combat platform
- Meets Combatant Commander requiremen

“The B-1 was the platform of choice during OEF & OIF!”

Lt Gen Moseley, CFACC

"The B-1, probably more than any other weapon system, gives us flexibility on the battlefield that no other airplane would with respect to time sensitive targeting.”

Gen Hal Hornburg, ACC/CC

“B-1 bombers…made their presence known in Baghdad, striking the dictator's regime until the regime was no more.”

President Bush

SIZE MATTERS!

Questions?

SYM BRT
SOURCE
R04
197
17:06
46
1.2/1.2
155
194
111-1
6 L095
X HAIR
RNG MK
DIS BRT OCTRS
DOVER BOMBING
5047
7059

Contractor / Government Activities

Organization	Location	Role
Prime contractor		
Boeing	**Long Beach, CA Oklahoma City, OK Chantilly, VA**	**Design; Engineering Software Datalink**
Major component contractors		
Northrop Grumman	**Baltimore, MD**	**Radar & test facility support**
Lockheed-Martin	**Owego, NY**	**Avionics control units**
General Electric	**Evendale, OH**	**Engines**
EDO Corporation	**Long Island, NY**	**ALQ-161**
NLX Corporation	**Sterling, VA**	**Simulators/Trainers**
Government field activities		
Aeronautical Sys Center	**WPAFB, OH**	**Program management**
Oklahoma City ALC	**Tinker AFB, OK**	**Sustainment, maintenance, repair**
AFOTEC	**Kirtland AFB, NM**	**Testing**

BONE's Greatest Hits

OBRVA AIRFIELD, SERBIA
POST STRIKE

- Operation DESERT FOX (1998)
  - First combat sorties – Mk 82 drops
- Operation ALLIED FORCE (1999)
  - Delivered 2.5 M pounds of Mk 82s
  - ALE-50 decoy "proven performer"
  - First BLOS datalink experience
- Operation ENDURING FREEDOM (starting Oct 2001)
  - JDAM "truck" – nearly 4000 delivered
  - Nearly 9 M pounds of weapons delivered
  - Datalink critical – in flight replanning emerges
- Operation IRAQI FREEDOM (starting Mar 2003)
  - Primary JDAM platform – 2159 dropped
  - Struck 10% of total targets hit
  - Time critical targets – continuous, airborne, on-call, precision st capability – datalink now vital to mission
  - In flight planning the norm – few "classic" ATO sorties
  - "Strike platform of choice" – CAOC Commander

Strategy for Future

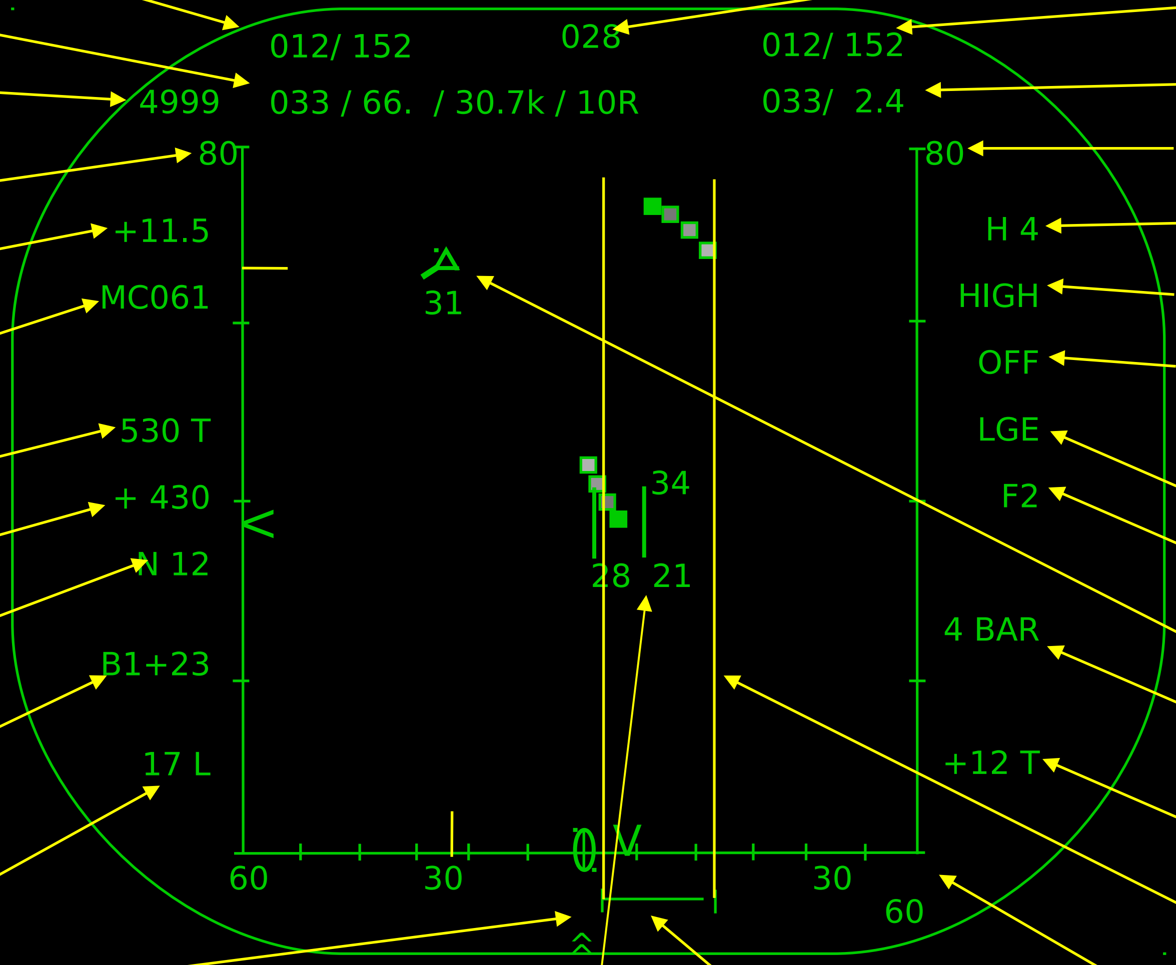
Grounding Issues!

- Keep the B-1 *Lancer* fleet flying – critical sustainment mods **In Work**
  - **In Work** Radar R&M Upgrade
  - **In Work** Central Integrated Test System (CITS)
  - **In Work** Inertial Navigation System/Gyroscope Stabilization System (INS/GSS)
  - **In Work** Vertical Situation Displays (VSD)
  - Defensive System (ALQ-161)
- Continue to push B-1 combat capability to the field **In Work**
  - **In Work** GBU-38 – 500 lb JDAM – lower collateral damage
  - JASSM-ER – extended-range standoff precision
- Modernize to address future requirements **In Work**
  - **In Work** Improve aircrew Situational Awareness -- new displays
  - Incorporate Integrated Line of Sight (LOS) and Beyond-LOS data links
  - Improve Sensors (EO/IR Targeting Pod, Radar upgrade)
  - Defensive System upgrade

"The B-1, probably more than any other weapon system, gives us flexibility on the battlefield that no other airplane would with respect to time sensitive targeting."

Block E1 ILST Display

Yes Air-to-Air Rdr…



012/ 152
028
012/ 152
4999
033 / 66. / 30.7k / 10R
033/ 2.4
80
80
+11.5
H 4
31
MC061
HIGH
OFF
530 T
LGE
34
+ 430
F2
N 12
28 21
4 BAR
B1+23
17 L
+12 T
60
30
30
60

LT BULL

LT BRAA

RA Radar Altimeter

Range Scale

LT Altitude Differential

LT MC

LT Vc Closing Velocity

LT TAS

LT Notch Indicator

LT Decision Range Time

Tanker Offset

Interference Indicator

B-1 MC

Capt Bar BULL

Capt Bar BRAA

Range Scale

Histories

GMTT Rejection

Altitude Line Blanking

Target Size

Frequency

LT Display

# of Elevation Bars

Tilt Indicator

Antenna Scan

Tgt Alt

Max Alt Min Alt

Scan Position Indicator

LT = Locked Target

Imagine if the machines could talk together. That's where we've got to go. … For the Air Force, go into the Combined Air Operations Center, and see the integration that's going on so we can do things like redirect that B-1 where it needs to be in near real time.

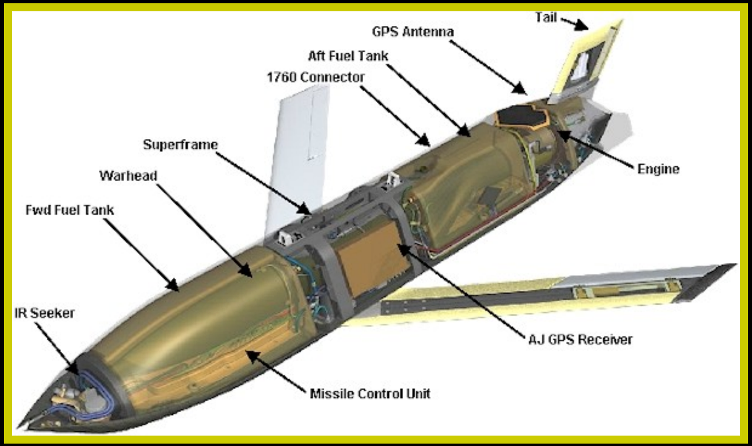
…shortening the timeline from sensor detection to weapons on target, we envision a future where network-centric warfare gives our nation an even greater asymmetric advantage in the war on global terrorism and in future combat operations.

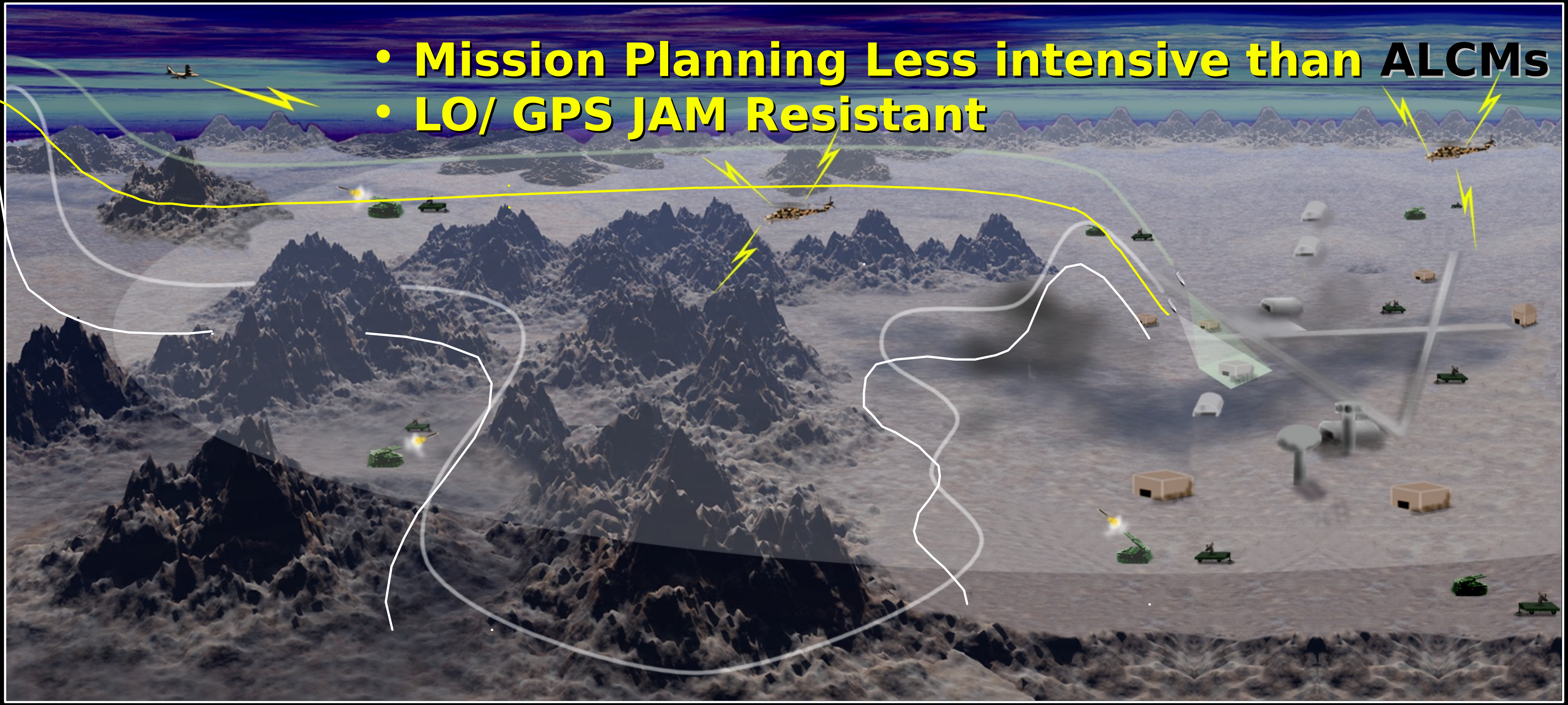
Gen John P. Jumper, USAF Chief of Staff

Quick Video

AGM-158 JASSM

- Joint Air-to-Surface Standoff Missile
  - Long-Range Precision Standoff
  - Weight: 2250 Pounds
    - 1000-Pound Unitary Warhead
  - Length: 14 Feet
  - Guidance: INS / GPS-Aided
  - Range: 200+ NM
- B-1 Carriage: 24
  - 8 JASSM per Bay


Tail
GPS Antenna
Aft Fuel Tank
1760 Connector
Superframe
Engine
Warhead
Fwd Fuel Tank
IR Seeker
AJ GPS Receiver
Missile Control Unit


- **Mission Planning Less intensive than ALCMs**
- **LO/ GPS JAM Resistant**

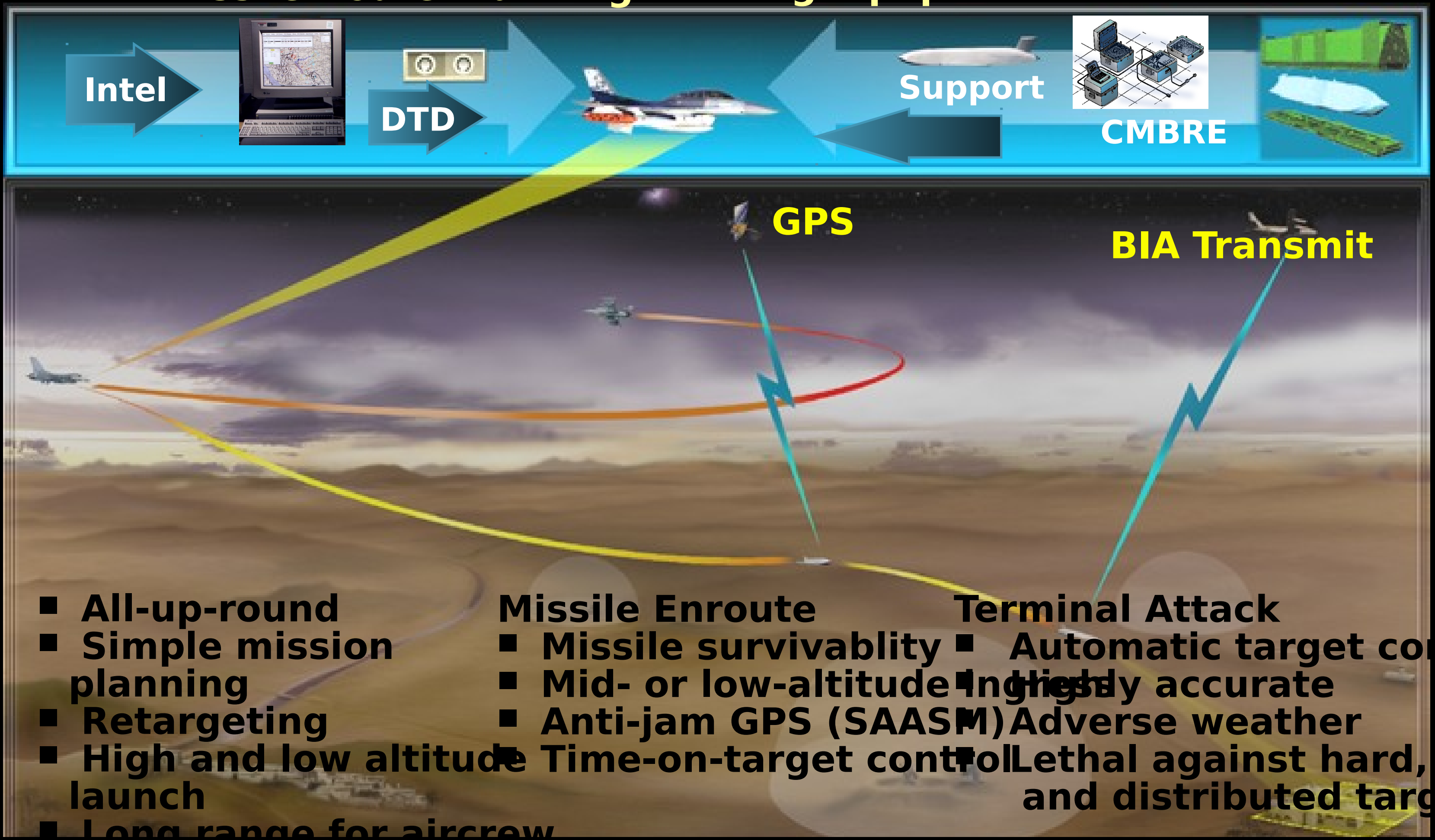
JASSM is a CALCM replacement!

JASSM Operational Concept

Mission Development
- Intelligence Support
- Missile Route Planning

Loading
- From container
- Existing equipment

Storage
- Wooden round
- In container BIT

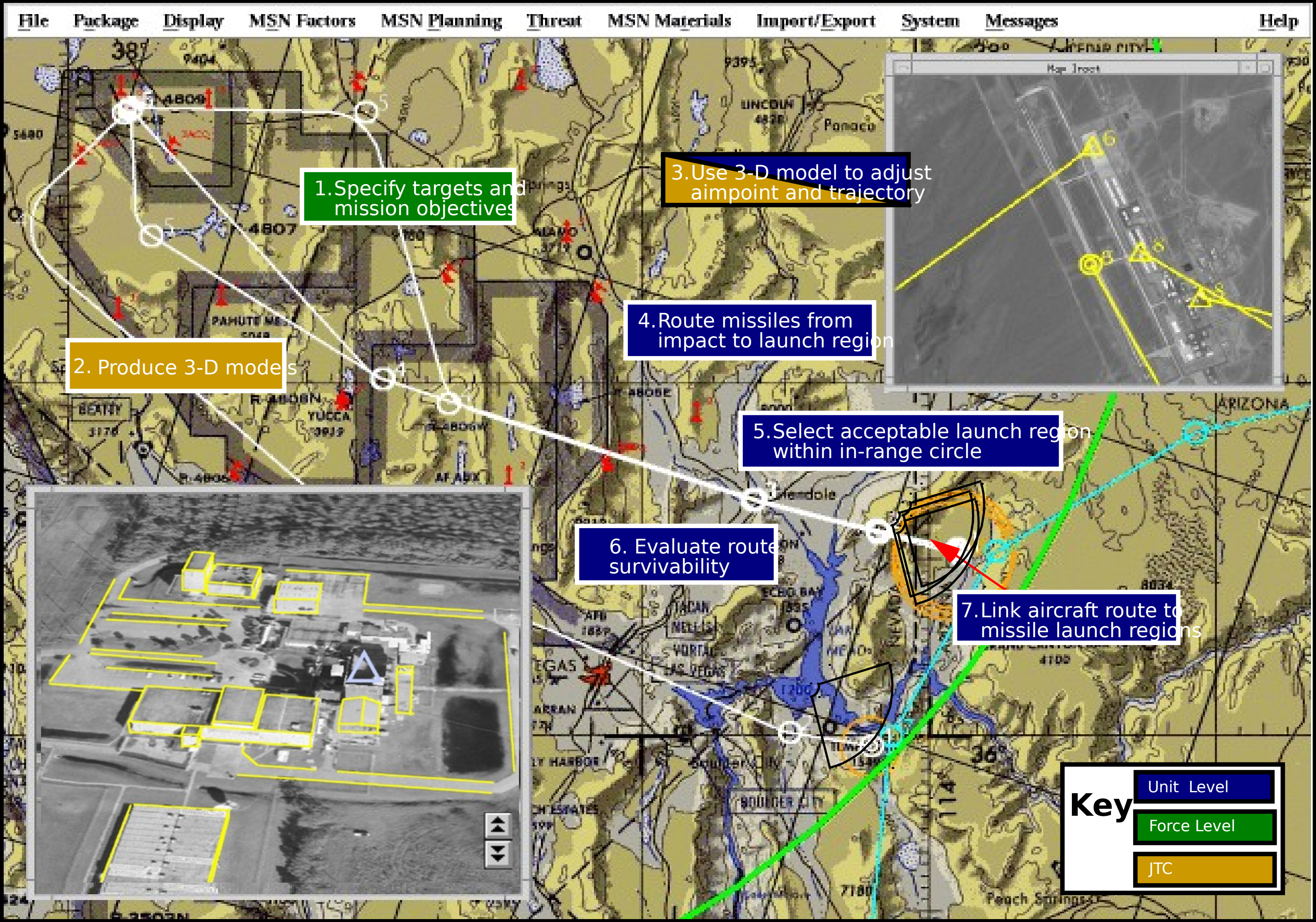


- All-up-round
- Simple mission planning
- Retargeting
- High and low altitude launch
- Long range for aircrew

Missile Enroute
- Missile survivablity
- Mid- or low-altitude ingress
- Anti-jam GPS (SAASM)
- Time-on-target control

Terminal Attack
- Automatic target co
- Highly accurate
- Adverse weather
- Lethal against hard, and distributed targ

Mission Development


File
Package
Display
MSN Factors
MSN Planning
Threat
MSN Materials
Import/Export
System
Messages
Help
Map Insert
LINCOLN
Panaca
PAHUTE ME
BEATTY
YUCCA
ARIZONA
NELLIS
LAS VEGAS
BOULDER CITY
Peach Springs

1.Specify targets and mission objectives

2. Produce 3-D models

3.Use 3-D model to adjust aimpoint and trajectory

4.Route missiles from impact to launch region

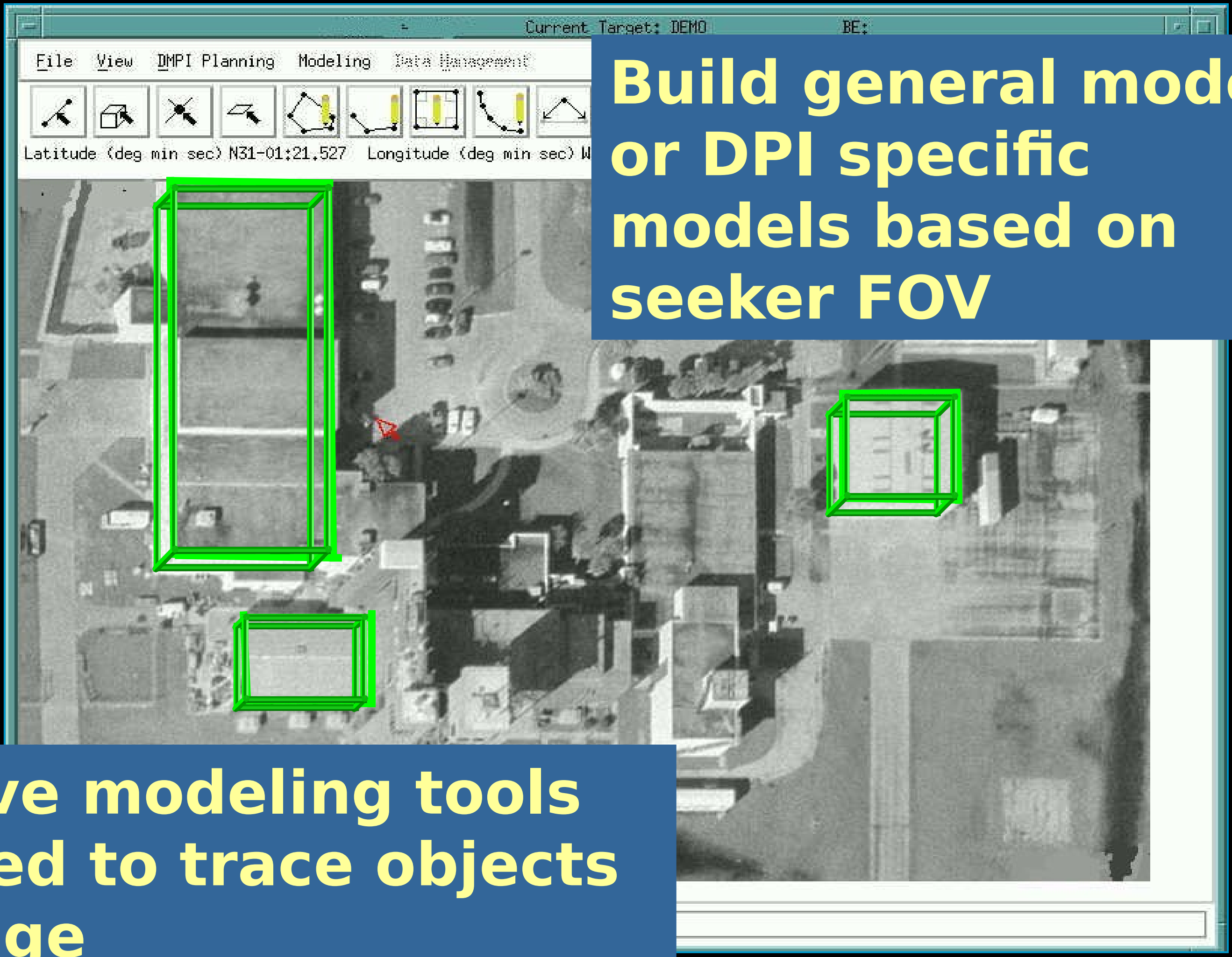
5.Select acceptable launch region within in-range circle

6. Evaluate route survivability

7.Link aircraft route to missile launch regions

Key
- Unit Level
- Force Level
- JTC

Building Target Model


File
View
DMPI Planning
Modeling
Data Management

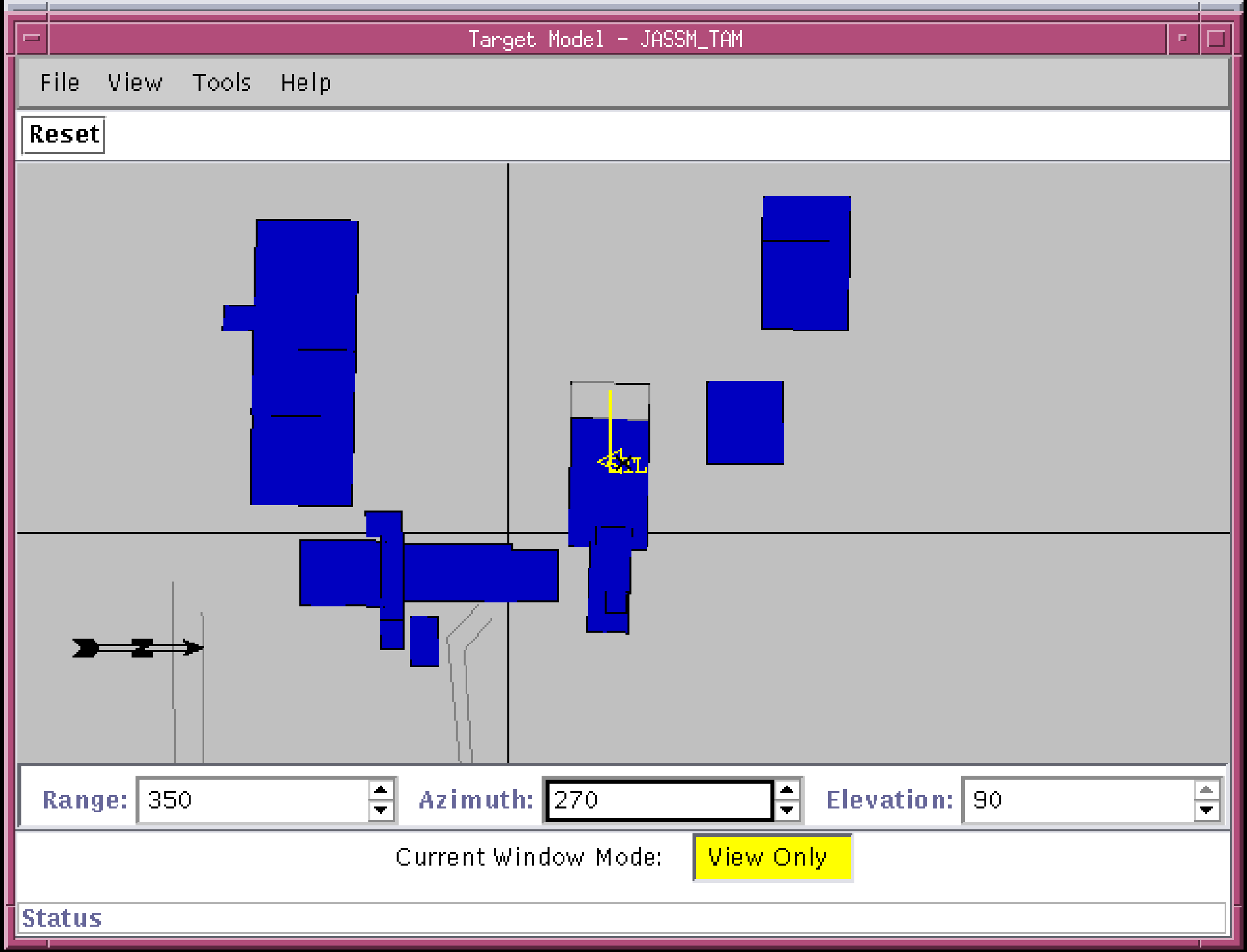
Current Target: DEMO BE:

Latitude (deg min sec) N31-01:21.527 Longitude (deg min sec) W

Build general models or DPI specific models based on seeker FOV

Intuitive modeling tools are used to trace objects on image

Viewing Wire Frame From Any Reference Point



Target Model - JASSM_TAM
File
View
Tools
Help
Reset

Range: 350

Azimuth: 270

Elevation: 90

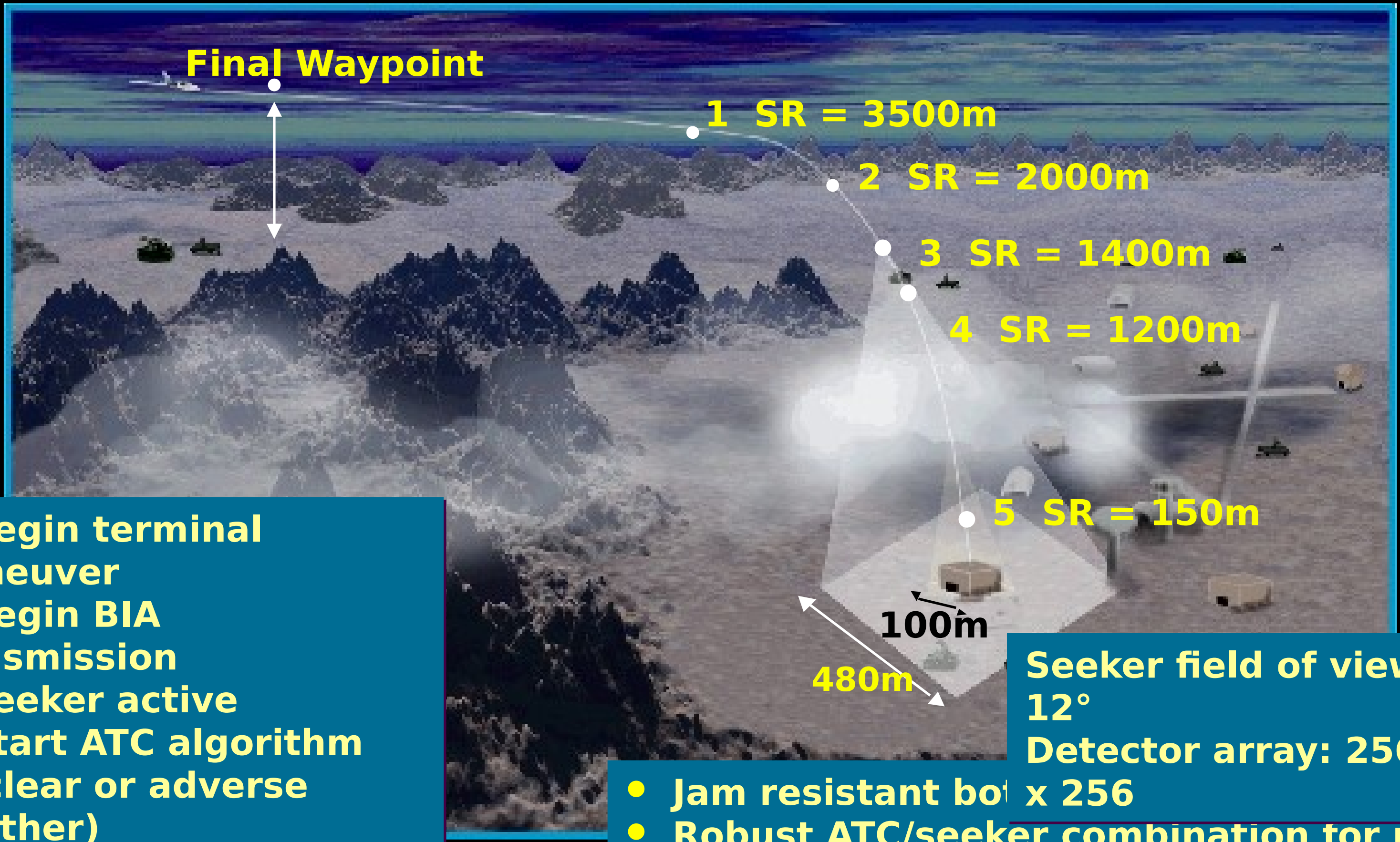
Current Window Mode: View Only

Status

Tactical

- **Close Air Support**
  - – Worked directly with ground forces to strike Iraqi Targets – within 200m of friendly forces
  - – Aided Special Operation Forces with capitulating forces
  - – Key striker during sand storms
    - Laser-guided weapons were unable to target during sand storms and inclement weather

JASSM Terminal Attack


Final Waypoint
1 SR = 3500m
2 SR = 2000m
3 SR = 1400m
4 SR = 1200m
5 SR = 150m
100m
480m

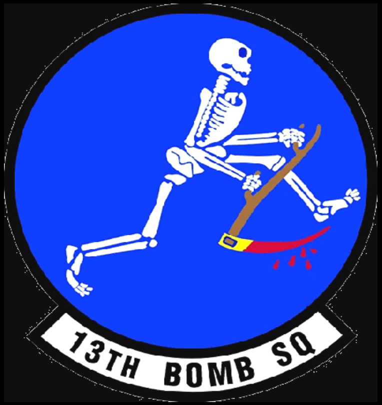
1) Begin terminal maneuver
2) Begin BIA transmission
3) Seeker active
4) Start ATC algorithm (clear or adverse weather)
5) Null Angle of Attack

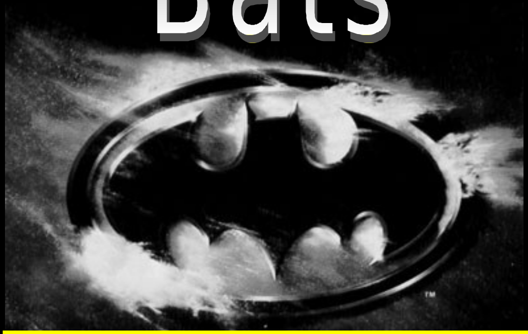
Seeker field of view: 12°
Detector array: 256 x 256

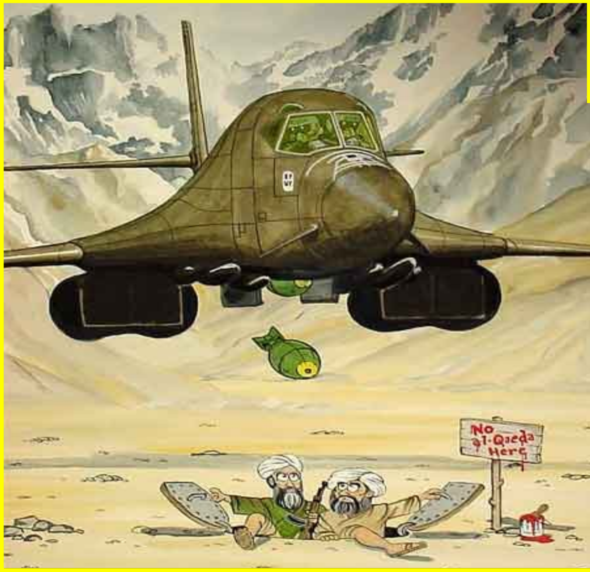
- Jam resistant bot et area
- Robust ATC/seeker combination for precision terminal attack
- Capable in 1500 ft / 3 nm weather

9TH EXPEDITIONARY BOMB SQ

"Bats"


13TH BOMB SQ




No al-Qaeda Here

REAPERS
DY
074
DY

- **8 B-1 Aircraft, 200+ personnel and 16 Crews**
- **Full range of mission capabilities:**

Sustainment Programs

Wing Shear Bearing

Cordwood Modules

Intermediate Automatic Test Equipment

The Bottom Line

- Precise
- Flexible
- Sustainable

B-1 "Good News" Stories

- B-1 CMUP has brought a new era in bomber employment
  - Flexibility -- Precision -- Persistence
  - Single-weapon-per-target capability with JDAM
  - Datalinks critical … in flight replanning now the norm … compressed timelines for targeting
- Operation IRAQI FREEDOM success story
  - Flew 1% of total sorties – delivered 42% of all JDAMs
  - Record-setting Mission Capable Rates
- World-class performance
  - Set 50 new world records (while retaining 50 others) – Oct 03
- Highly successful JASSM launch with "full-up" round – Mar 04

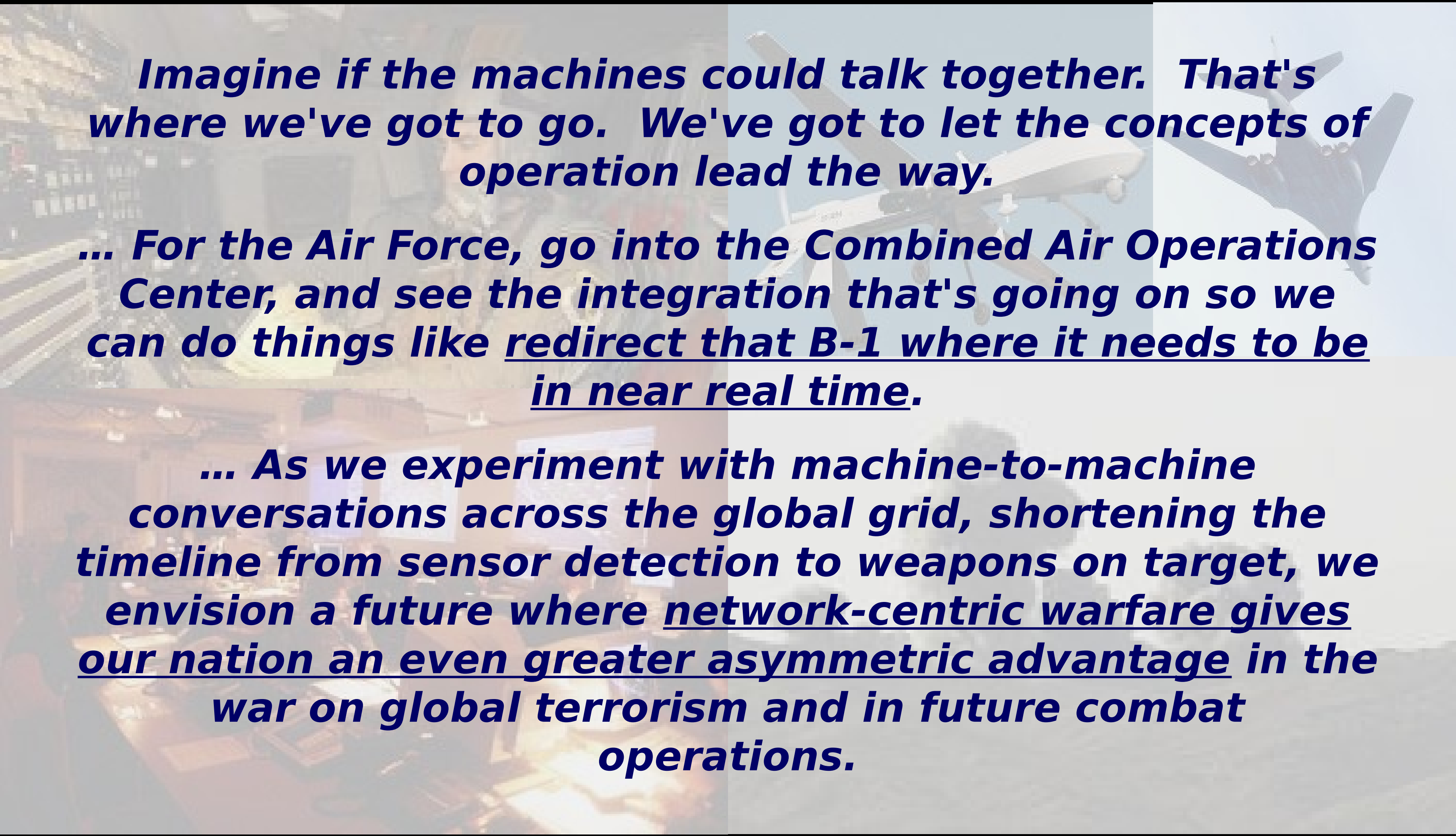
CMUP has delivered war-winning capability
to the theater commanders

Summary

- AF Vision for the conventional bomber force established in 1992
- The past decade has seen that vision realized
  - Precision weapons from bomber platforms
  - True Close Air Support missions by heavy bombers
  - Beginning of datalink impacts on air operations
- Network Centric Warfare is the next vision for the force
  - A challenge to implement on legacy platforms
  - Along with sustainment issues, will drive avionics

> **"The B-1, probably more than any other weapon system, gives us flexibility on the battlefield that no other airplane would with respect to time sensitive targeting."**
>
> **Gen Hal Hornburg, ACC/CC**

Leadership Vision - CSAF



Imagine if the machines could talk together. That's where we've got to go. We've got to let the concepts of operation lead the way.

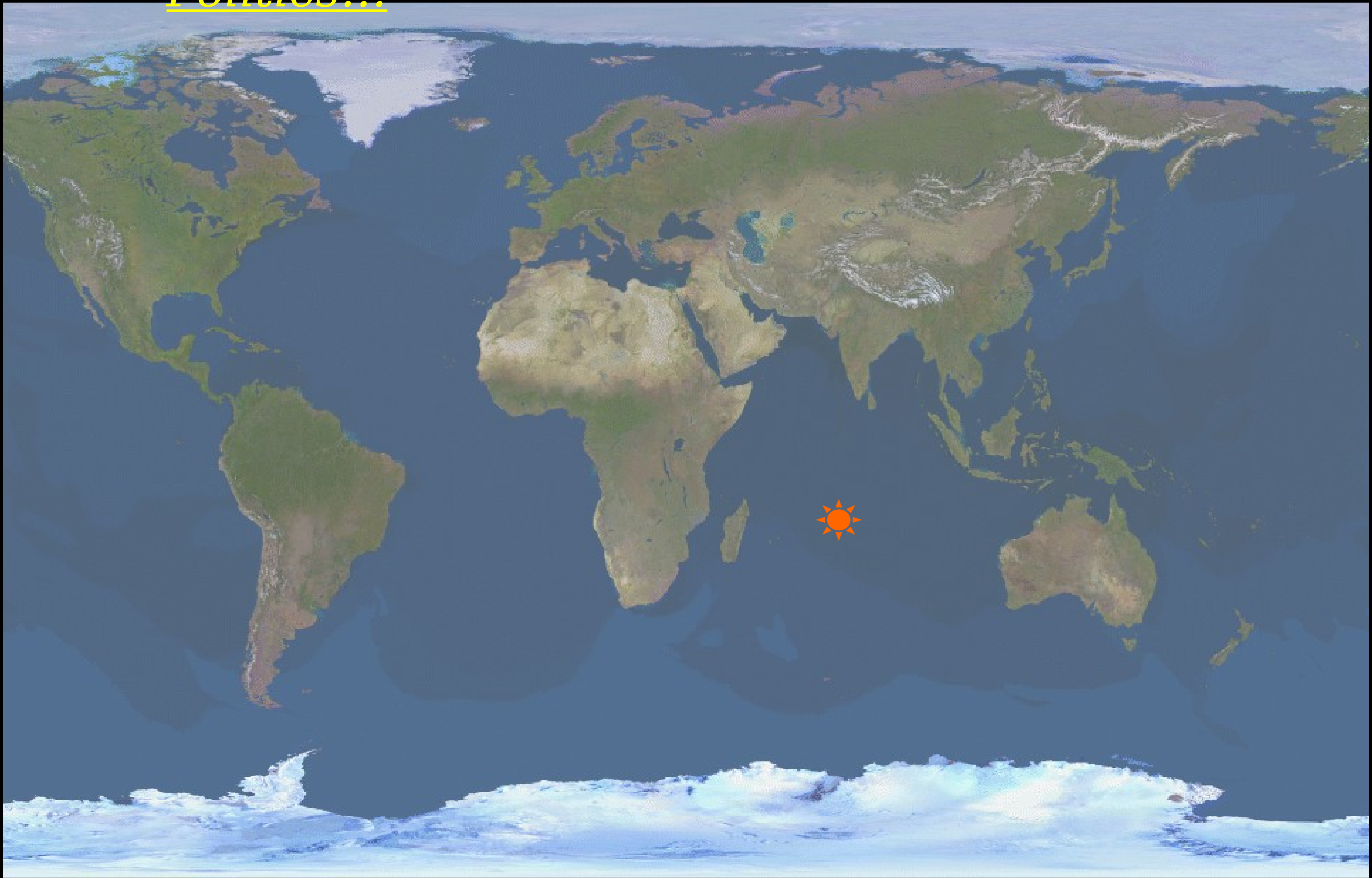
… For the Air Force, go into the Combined Air Operations Center, and see the integration that's going on so we can do things like redirect that B-1 where it needs to be in near real time.

… As we experiment with machine-to-machine conversations across the global grid, shortening the timeline from sensor detection to weapons on target, we envision a future where network-centric warfare gives our nation an even greater asymmetric advantage in the war on global terrorism and in future combat operations.

Gen John P. Jumper, USAF Chief of Staff

LOCATION

Ultimate Application of Geography and Politics…



Fully Integrated Datalink (FIDL)

- **Integrates Link 16 and Joint Range Extension (JRE) datalinks with aircraft systems**
    - **Incorporates expanded J-series messages over IDL**

- **Upgrades displays at OSO and DSO with color Multifunctional Displays (MFDs) to support display of datalink and weapons management info**

- **Software upgrades to include addition of automated retargeting capability to take new target data from datalinks and pass to the on-board weapons**

- **First fields in late CY08**

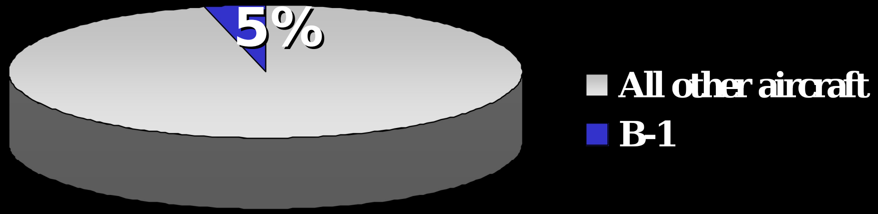
IDL vs FIDL

- **IDL provides basic situational awareness**
  - 16 J-series messages total, including:
    PPLI, Air & Ground Surveillance Tracks, Threat Warning, Free Text

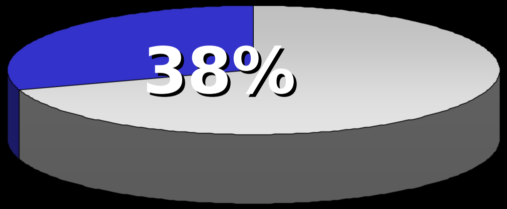
- **FIDL provides the entire set of messages from Mil Std 6016C applicable to B-1 missions/roles, to include package or mission commander, or support roles to the package or mission commander**
  - 48 J-series messages total, including:
    Electronic Warfare
    Intelligence
    Weather
    Control
    Platform & Systems Status
    Voice (Objective)
    Precise Participant Location & ID (PPLI)
    Air & Ground Surveillance Tracks
    Threat Warning
    Free Text
    Weapons Coordination & Mgt
    Imagery

The BONE’s Contribution

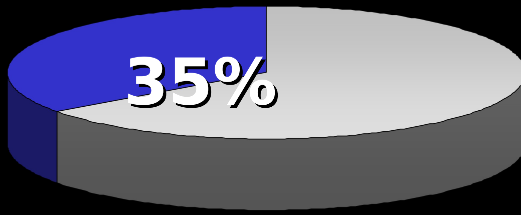
Product of Precision and Payl



Sorties Flown



Weapons Droppe



Targets Destroyed

> ***“We’re not running out of targets, Afghanistan is…..”*** - Secretary of Defense Rumsfeld

Operation ENDURING FREEDOM

- Ellsworth deployed 8 aircraft to Diego Garcia, BIOT in 2001
  - Flew an average of 6 sorties per day
  - Average sortie duration of 11-12 hours
  - Initially majority of sorties were INT, then transitioned to more XINT, XCAS

OEF

BONE Community Response…

- 28th BW generated 14 fully combat-loaded A/C from across the B-1 community in 5 Days

Aircraft/Personnel

  - 4 x B-1s (28/28/10)
  - 4 x B-1s (3 x CRL)
  - All 8 B-1s
    - Combat Track II (Secure Satellite e-mail)
    - ALE-50 Towed Decoy System
  - 16 Aircrews (2.0 crew ratio)

34th BOMB SQUADRON

37th BOMB SQUADRON

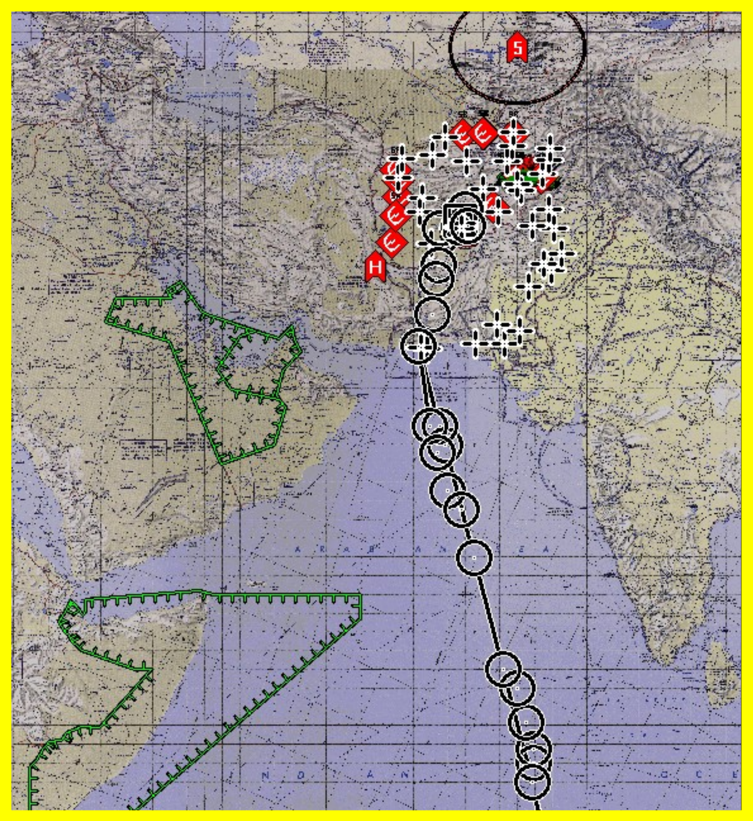
28TH BOMB WING

28th Bomb Wing

B-1 history Oct-mid Dec 20

28th AIR EXPEDITIONARY WING
OPERATION ENDURING FREEDOM

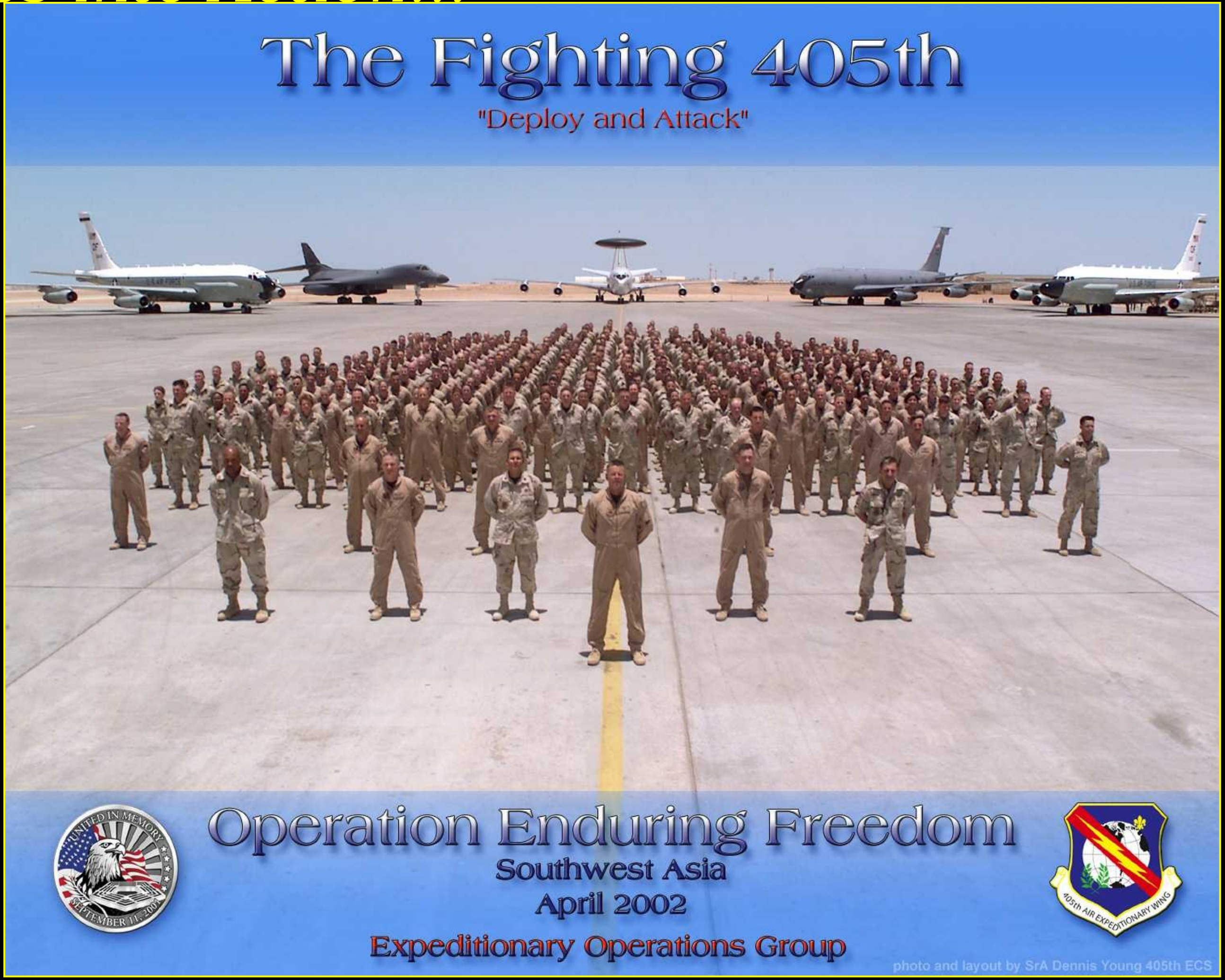
- Rapid deployment to Diego Garcia
- Combat ops from day #1
- Long sorties with standard profiles and load-outs



7th Bomb Wing

Dyess Moves into Action…

- Notified on 14 Dec 01
- Deployed 36 hours later
- Stood-up 405th 5 days later
- Moved B-1s from Diego 1 week later
- Full-up combat ops


The Fighting 405th
"Deploy and Attack"
Operation Enduring Freedom
Southwest Asia
April 2002
Expeditionary Operations Group
UNITED IN MEMORY
SEPTEMBER 11, 2001
405th AIR EXPEDITIONARY WING
photo and layout by SrA Dennis Young 405th ECS

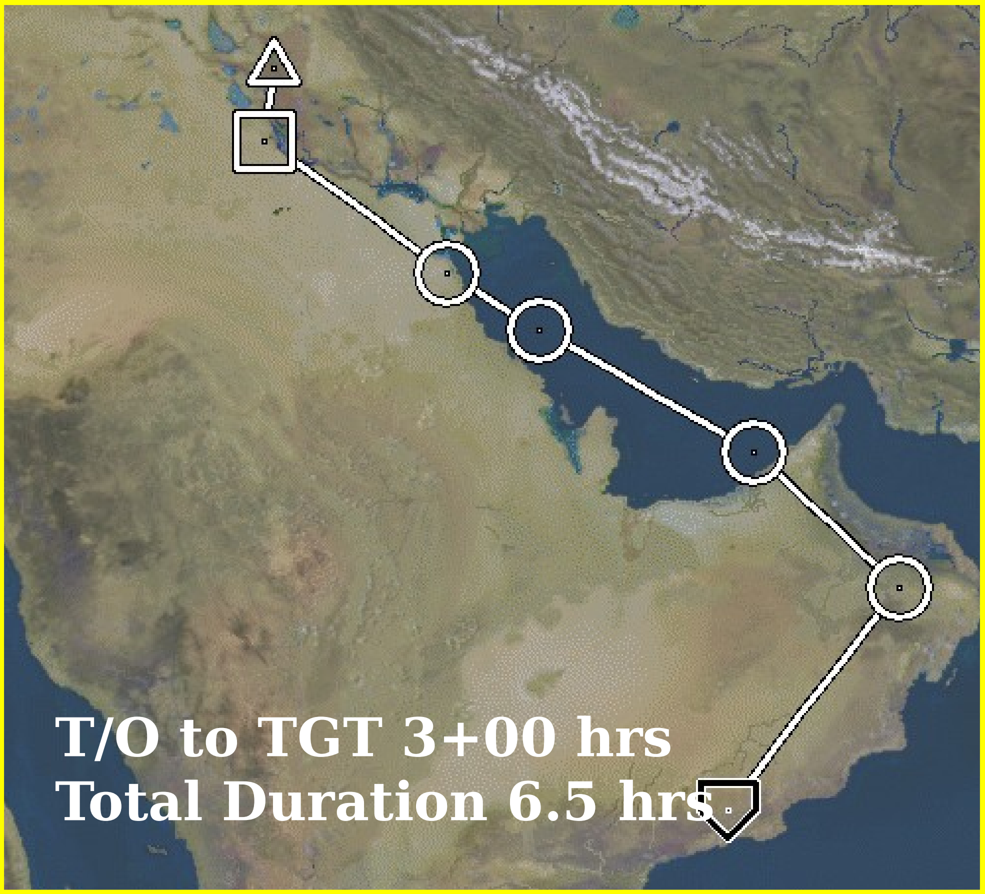
405th Operations Group

UNITED STATES
CENTRAL COM
405th AIR EXPEDITIONARY WING

GAS IT, FIND IT, FIX IT AND KILL IT

In one wing, we conducted our own air to air refueling, reconnaissance, intelligence, command and control and strike missions. No

Operation DESERT FOX

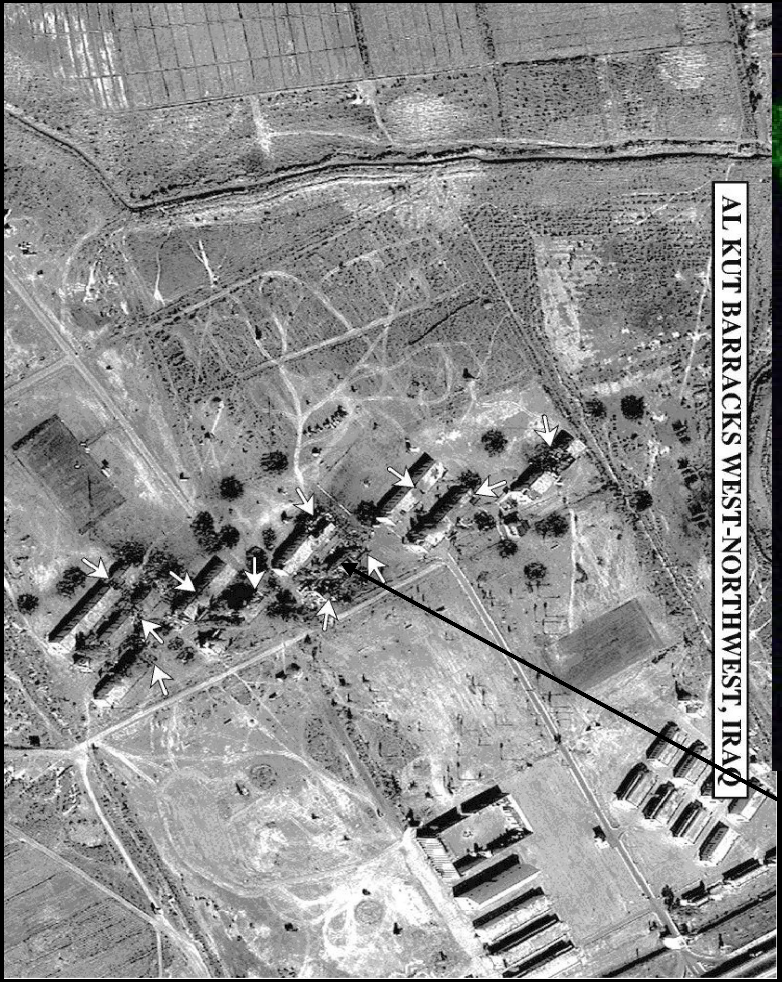


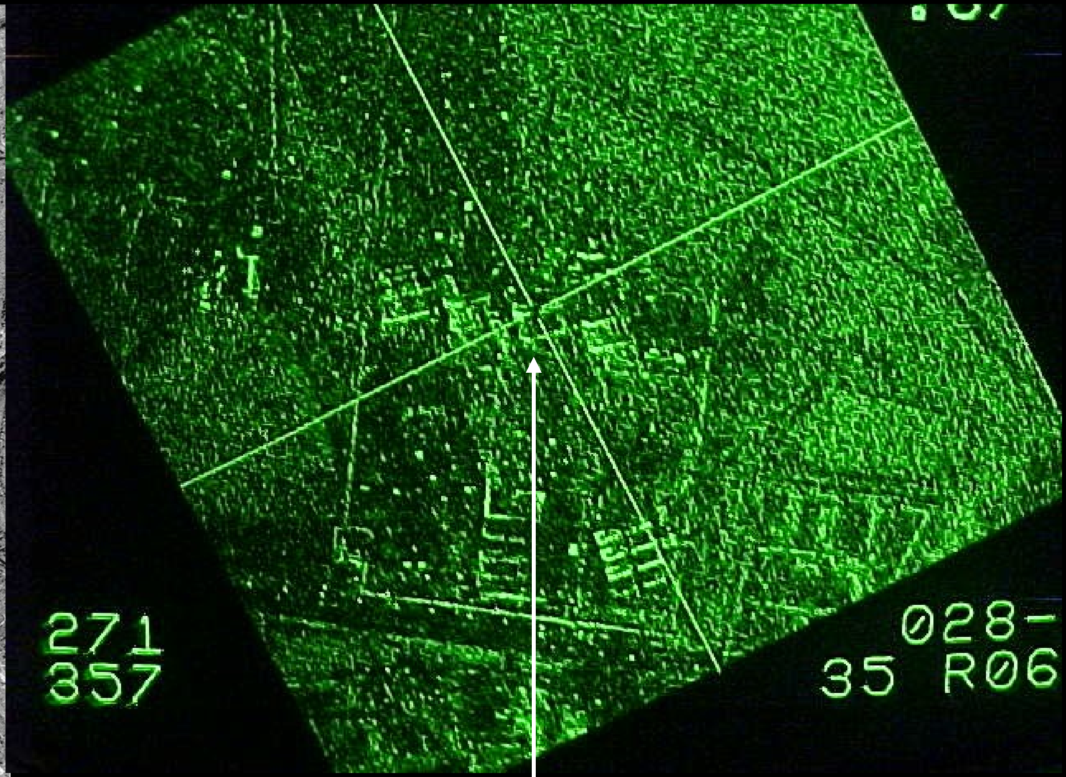
T/O to TGT 3+00 hrs
Total Duration 6.5 hrs

- B-1 Combat Debut
- Iraq forces move south
- 4 B-1s Deploy
- 4 Days of Strikes in Dec 98

DESERT FOX

HI-RES RADAR DISPLAY…


AL KUT BARRACKS WEST-NORTHWEST, IRAQ


271
357
028-
35 R06

AIM POINT
IMPACT POINT

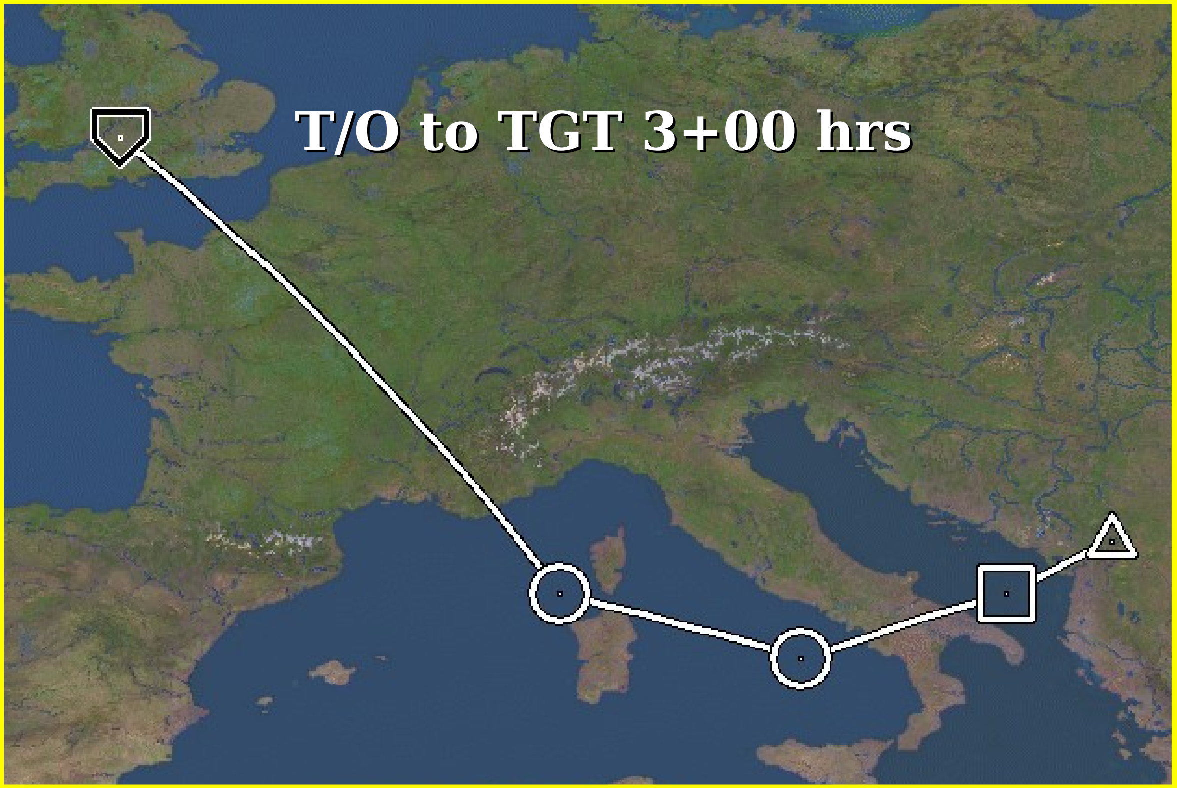
Desert Fox

B-1 Combat Début…

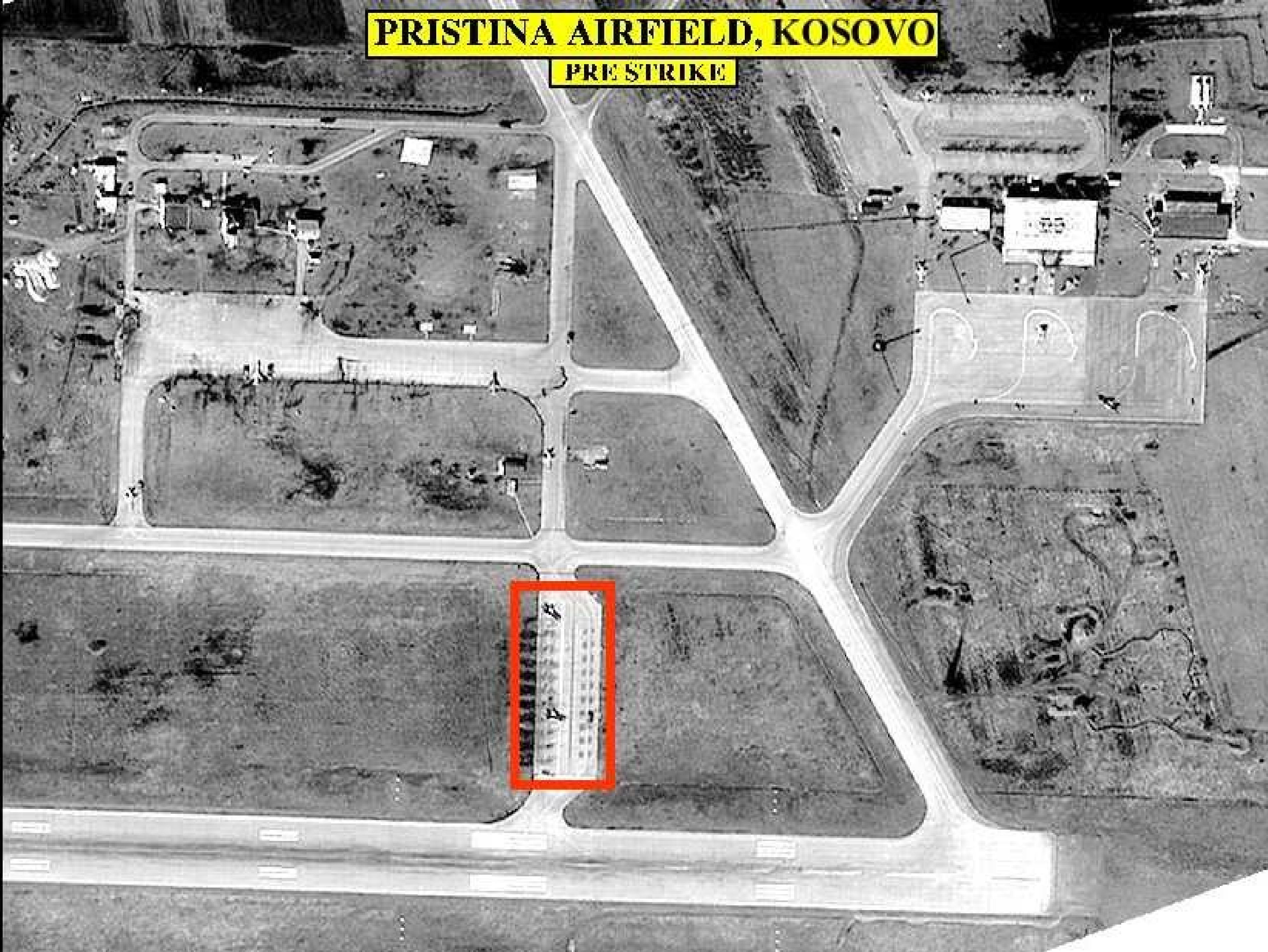
- USAF/USN Joint Operation
- Dyess & Ellsworth Warfighters
- Targeted Republican Guard barracks

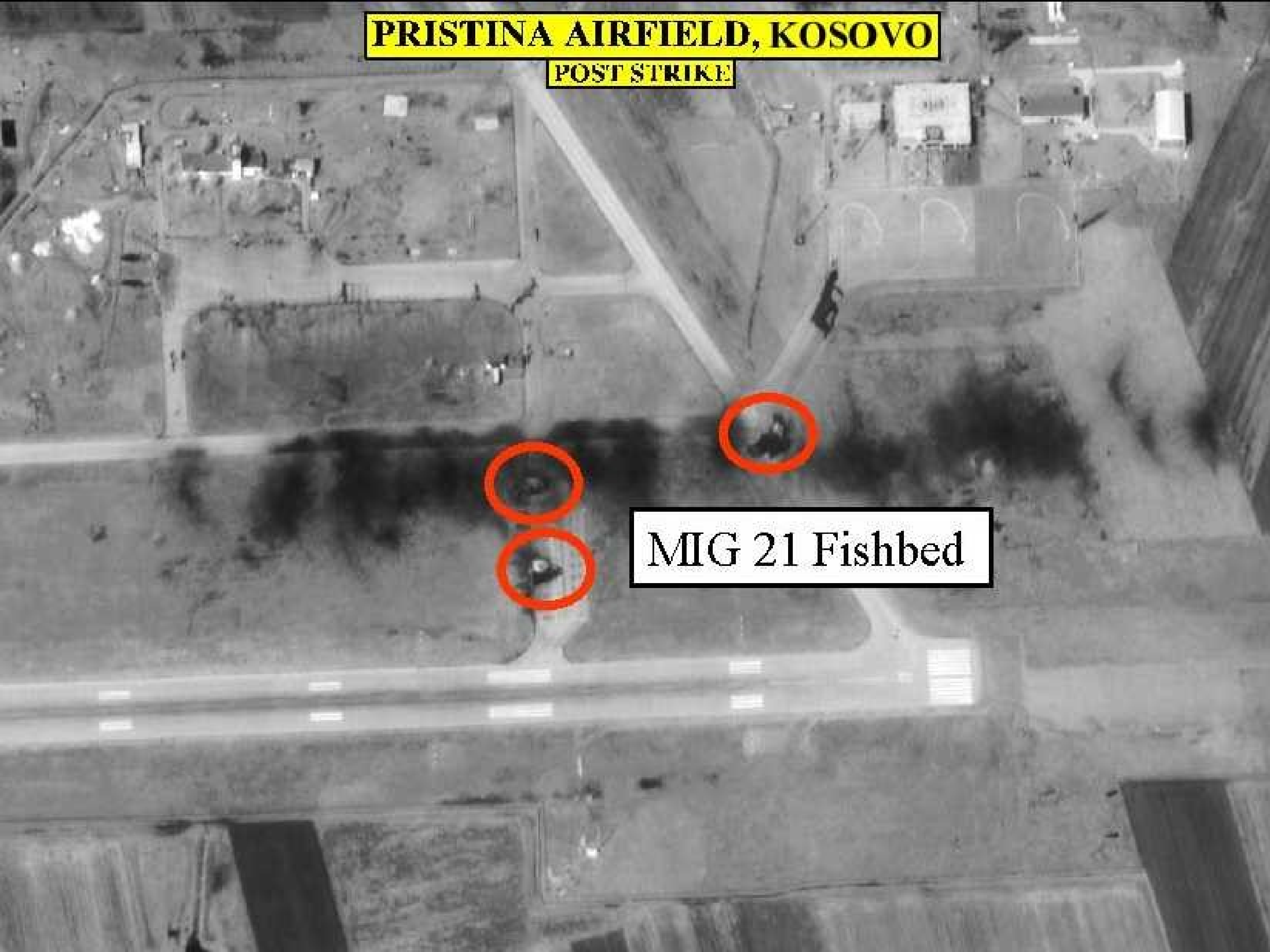
OPR
LO
25° L
IN ZONE
ADV-CDRTB,BIT,
29400 B

Operation ALLIED FORCE



- **April – June 1999 / Serbia**
- **19 Country NATO Operation**
- **4 B-1's delivered 20% of all weapons**
- **Launched first combat sorties within 14 hours of arrival at the forward operating location**
- **Flew 100 combat sorties and dropped 5,037 weapons amounting to 2,527,570 pounds**


PRISTINA AIRFIELD, KOSOVO
PRE STRIKE



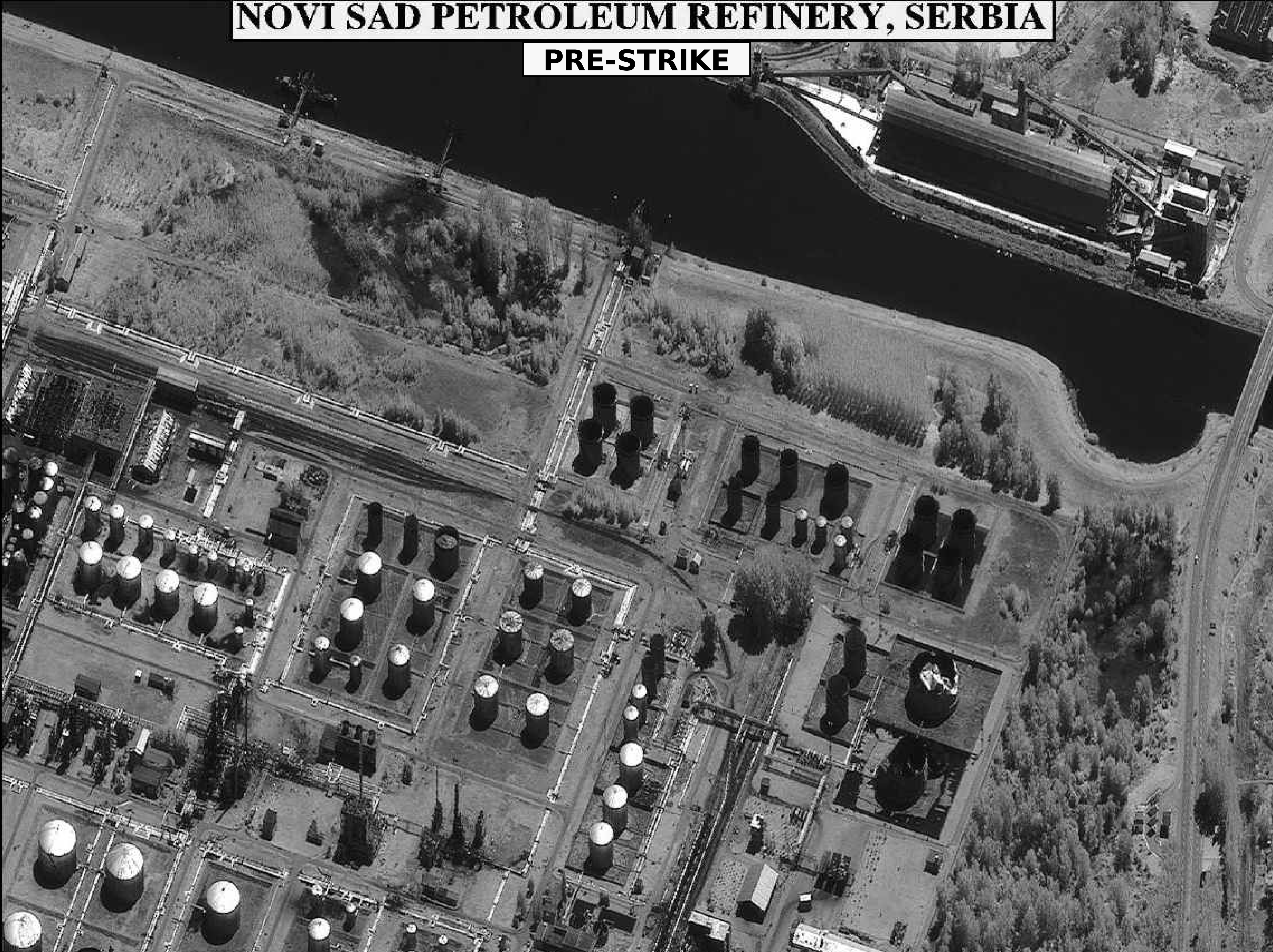
PRISTINA AIRFIELD, KOSOVO

POST STRIKE

MIG 21 Fishbed

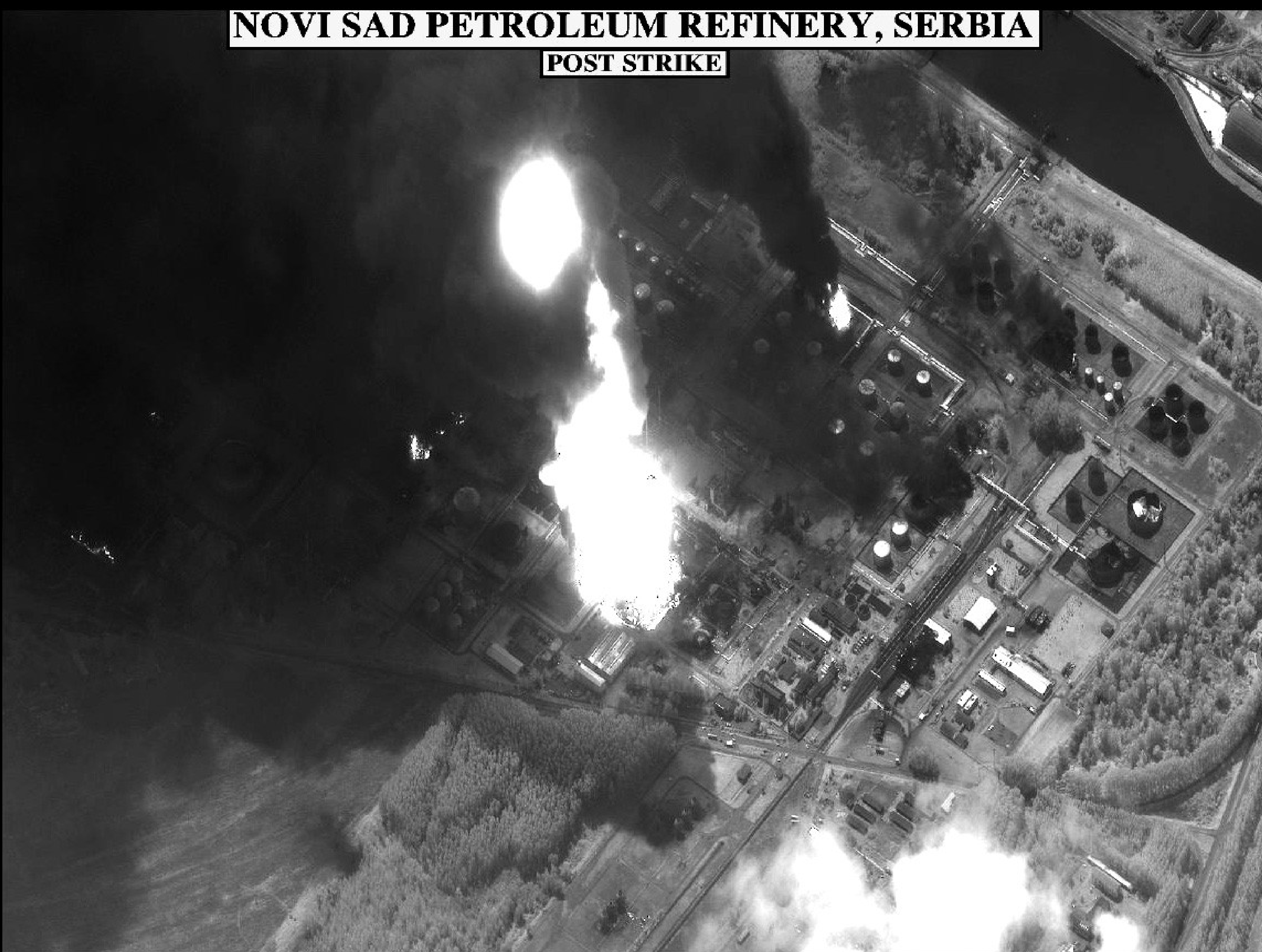
NOVI SAD PETROLEUM REFINERY, SERBIA

PRE-STRIKE



NOVI SAD PETROLEUM REFINERY, SERBIA

POST STRIKE

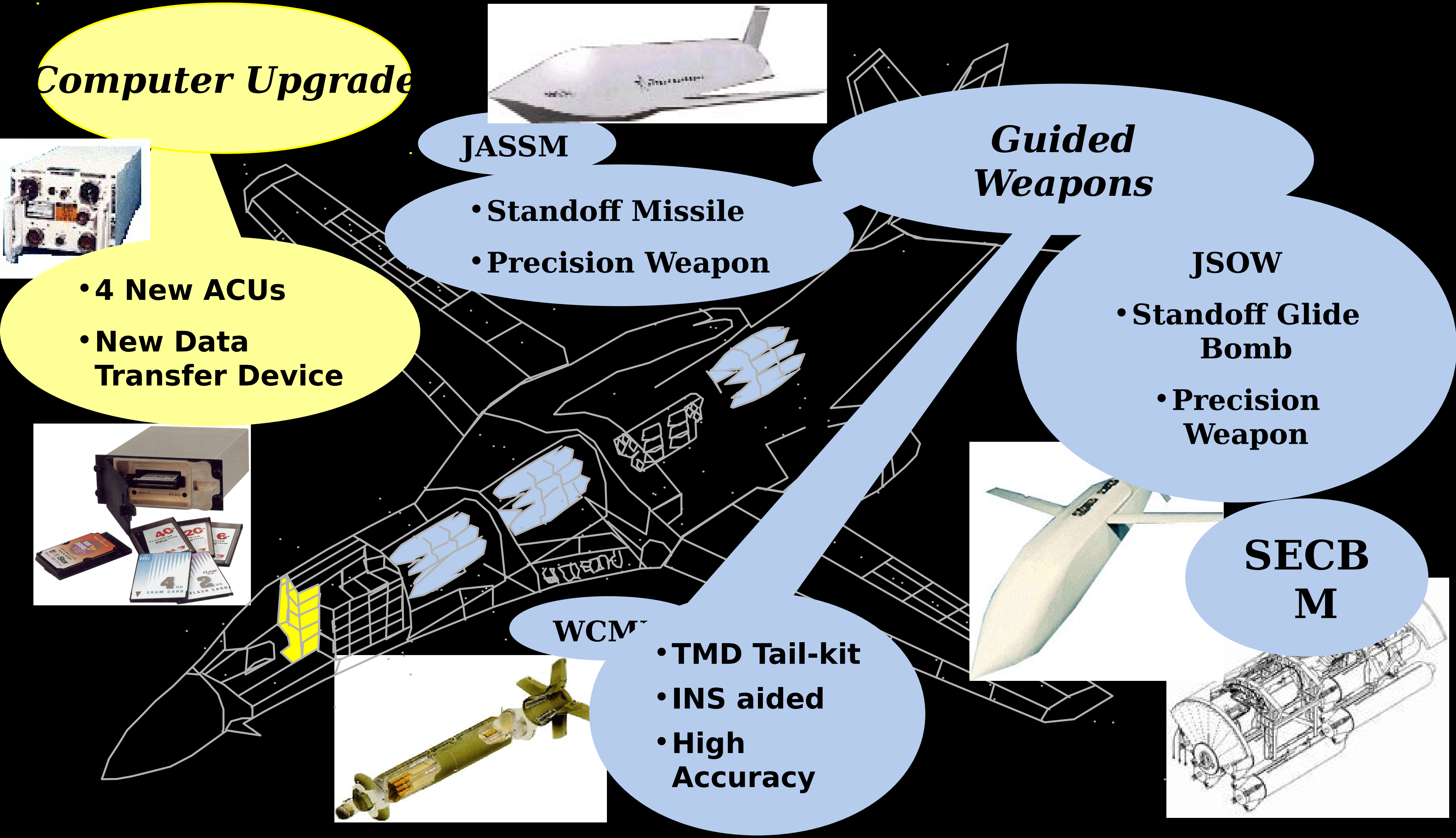


Conclusion

- B-1 played a vital role during OIF
  - Reliable, Flexible, and Lethal
- Proven combat platform
- Combatant Commander requirement

BLOCK E - Overview

Computer/WCMD/JSOW/JASSM/SECBM



Computer Upgrade

- **4 New ACUs**
- **New Data Transfer Device**

JASSM

- **Standoff Missile**
- **Precision Weapon**

Guided Weapons

JSOW

- **Standoff Glide Bomb**
- **Precision Weapon**

SECBM

WCM

- **TMD Tail-kit**
- **INS aided**
- **High Accuracy**

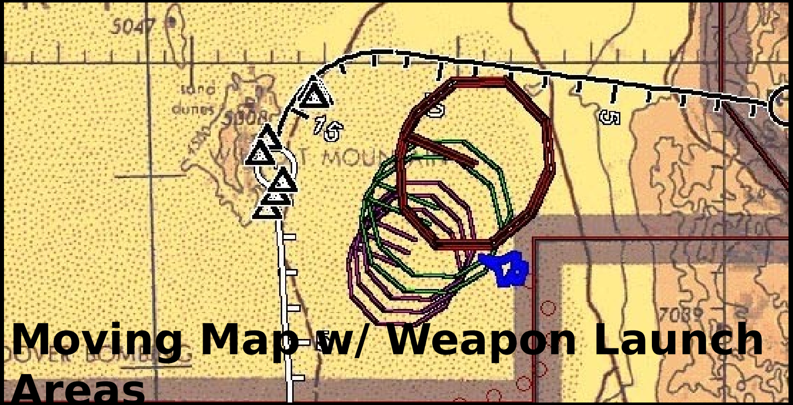
Situational Awareness
Beyond Line of Sight (BLOS) Data Link/Situational Awareness Enhancement (SAE) System

OEF Combat Mission Need Statements

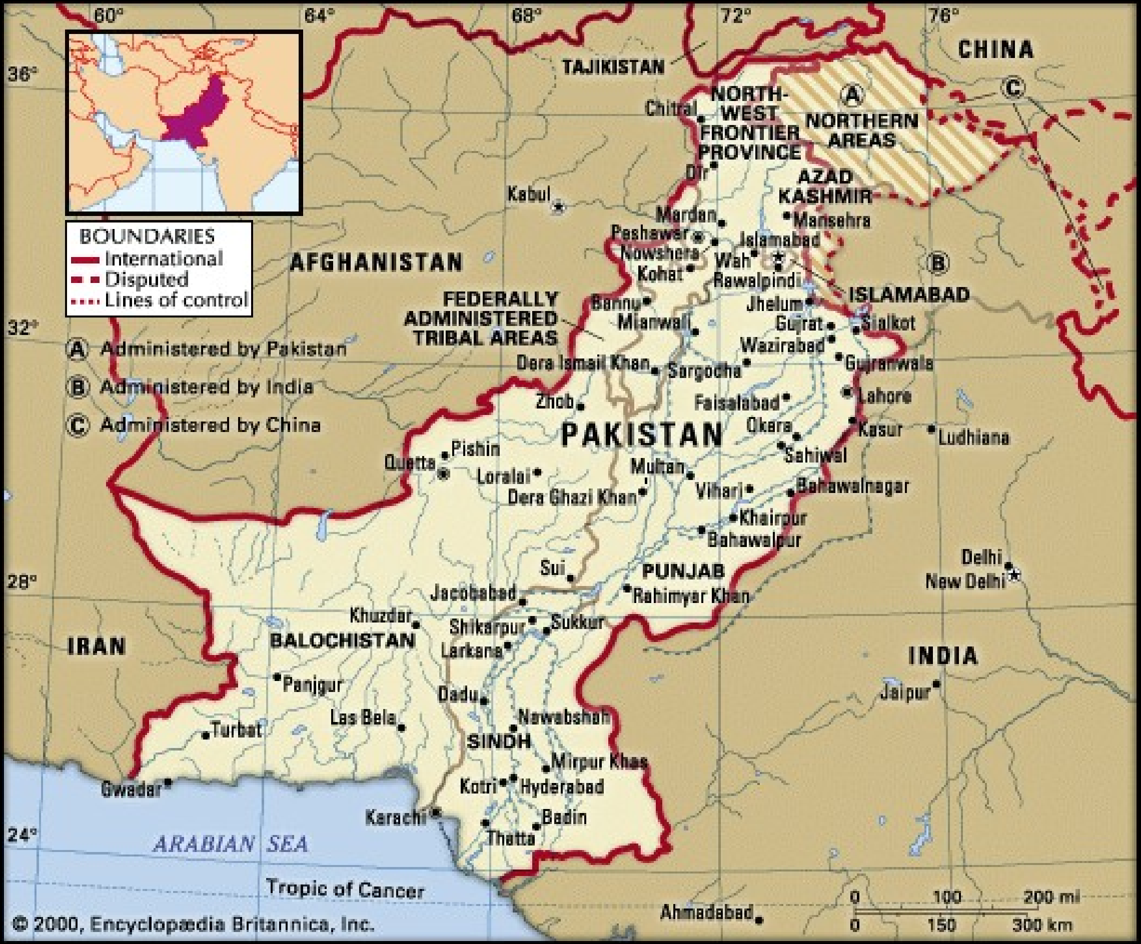
Pilot’s Tablet PC

OIF Success Story

WSO’s Laptop w/ Moving Map Display



Moving Map w/ Weapon Launch Areas


60°
64°
68°
72°
76°
36°
32°
28°
24°
CHINA
TAJIKISTAN
Chitral
NORTH-WEST FRONTIER PROVINCE
Ⓐ
NORTHERN AREAS
Ⓒ
Dir
AZAD KASHMIR
Kabul
Mardan
Mansehra
Peshawar
Islamabad
Nowshera
Wah
Kohat
Rawalpindi
Ⓑ
ISLAMABAD
AFGHANISTAN
BOUNDARIES
International
Disputed
Lines of control
FEDERALLY ADMINISTERED TRIBAL AREAS
Bannu
Jhelum
Mianwali
Gujrat
Sialkot
Wazirabad
Gujranwala
Ⓐ Administered by Pakistan
Ⓑ Administered by India
Ⓒ Administered by China
Dera Ismail Khan
Sargodha
Faisalabad
Lahore
Zhob
Okara
Kasur
Ludhiana
PAKISTAN
Pishin
Sahiwal
Quetta
Multan
Loralai
Vihari
Bahawalnagar
Dera Ghazi Khan
Khairpur
Bahawalpur
Delhi
New Delhi
Sui
PUNJAB
Jacobabad
Rahimyar Khan
Khuzdar
Shikarpur
Sukkur
IRAN
BALOCHISTAN
Larkana
INDIA
Panjgur
Dadu
Jaipur
Las Bela
Nawabshah
Turbat
SINDH
Mirpur Khas
Kotri
Hyderabad
Gwadar
Karachi
Badin
Thatta
ARABIAN SEA
Tropic of Cancer
Ahmadabad
0 100 200 mi
0 150 300 km

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JOINT DIRECT ATTACK MUNITION
(JDAM)

- **Guidance kit for existing 1,000 & 2,000 lb bombs**
- **Global positioning & inertial guidance = 10 meter accuracy**
- **Will be carried on all USAF bombing platforms**

All-Weather, Near-Precision Accuracy

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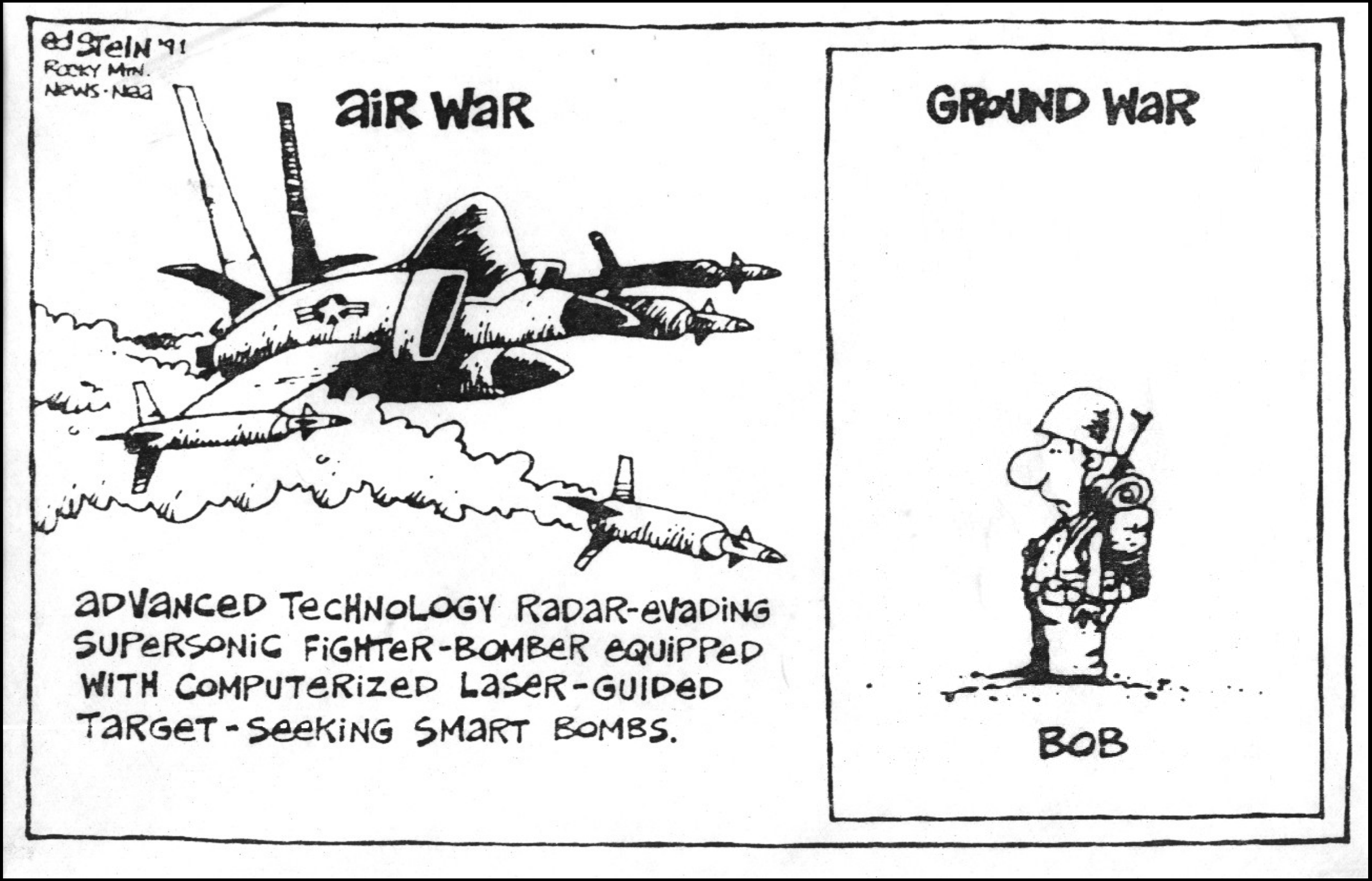
JOINT DIRECT ATTACK MUNITION
(JDAM)

JDAM
(BLU-109)

Accurate, Hard-Target Penetration

The Nature of…
Airpower


ed Stein '91
Rocky Mtn.
News · NEA
AIR WAR
ADVANCED TECHNOLOGY RADAR-EVADING SUPERSONIC FIGHTER-BOMBER EQUIPPED WITH COMPUTERIZED LASER-GUIDED TARGET-SEEKING SMART BOMBS.
GROUND WAR
BOB

Statistics

- 414 Total B-1 sorties during OIF
  - Includes flights prior to the start of OIF and after 18 Apr
  - During this time B-1s supported
    - Horn of Africa Operations
    - Operation Southern Watch
    - Operation Enduring Freedom
- 34 EBS
  - 10 B-1s total
  - Averaged 8 sorties per day – OSW and OIF
    - First night - 10 sorties
    - Average duration = 10.8 hours